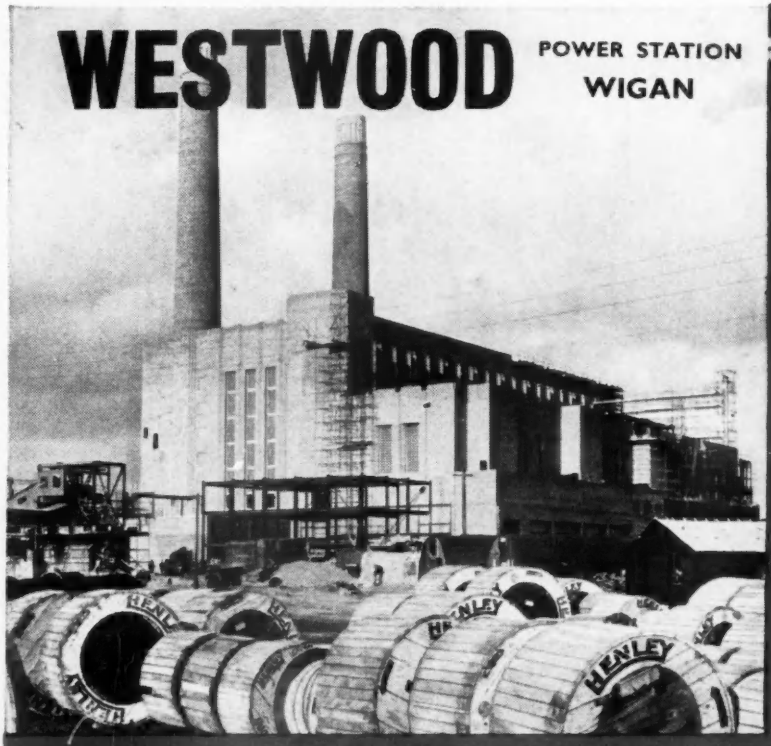
ELECTRICAL TIMES

THURSDAY
27 DEC.
1951
NINEPENCE

WESTWOOD POWER STATION WIGAN

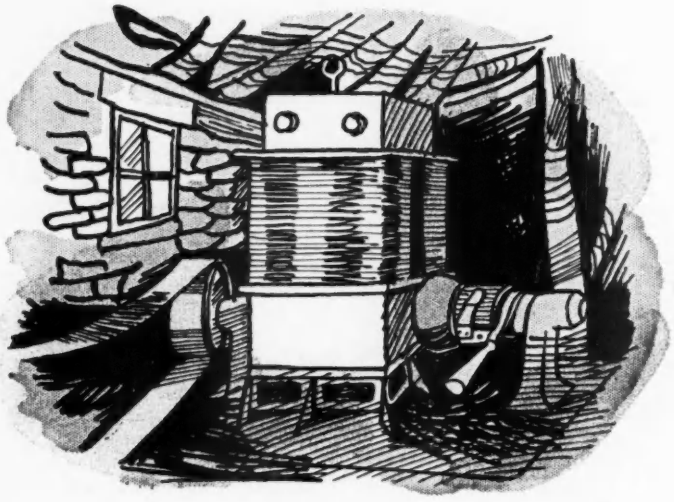


HENLEY'S were responsible for the entire cabling installation at Westwood Generating Station, Wigan.

Consulting Engineers: Kennedy & Donkin

HENLEY CABLES

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. 51-53 HATTON GARDEN, LONDON, E.C.1



From flapping belts and gauze brushes to 275,000 volts

M & I started in the days when generators were belt driven and gauze brushes sparked on their commutators and slip rings.

But its founders were men of vision : in 1901 they formed a company for the manufacture of bonded mica insulation which has since grown until it is now one of the largest organisations of its kind in the world specialising in Electrical Insulation Engineering.

It is appropriate that in this our Jubilee Year, we should be producing 275,000 volt terminal bushings for the National super grid, and preparing to manufacture for even higher voltages.

---

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Empire Works, Blackhorse Lane, Walthamstow, London, E.17

MANUFACTURERS OF MICANITE (BUILT-UP MICA INSULATION). FABRICATED AND PROCESSED MICA. PAXOLIN LAMINATED MATERIALS. PANILAX LAMINATED MATERIALS AND MOULDINGS EMPIRE VARNISHED INSULATING CLOTHS AND TAPES. HIGH VOLTAGE BUSHINGS AND TERMINALS

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'English Electric' produce a full range of single-phase house service meters in both moulded insulated and all-metal cases. The range covers standard current ratings of 2½, 5, 10, 25 and 50 amps.

The meters are temperature compensated, are of standard dimensions and "long range" to B.S. 37—1937, and are covered by all approval certificates. Accurate manufacture of each component part and accurate assembly by skilled operators ensure that 'English Electric' house service meters, which are simple to calibrate, sustain their accuracy under all normal operating conditions.

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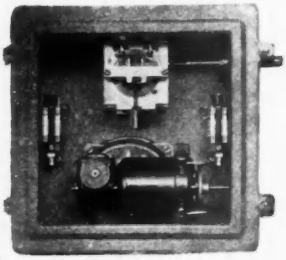

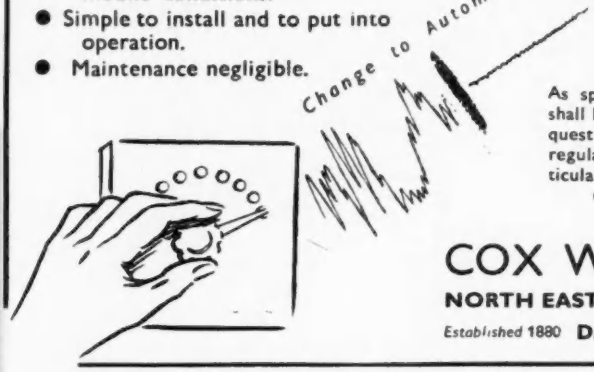

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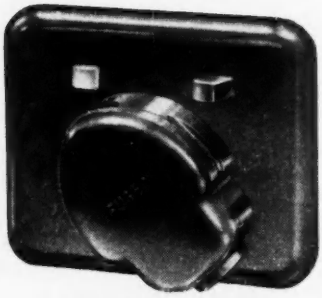

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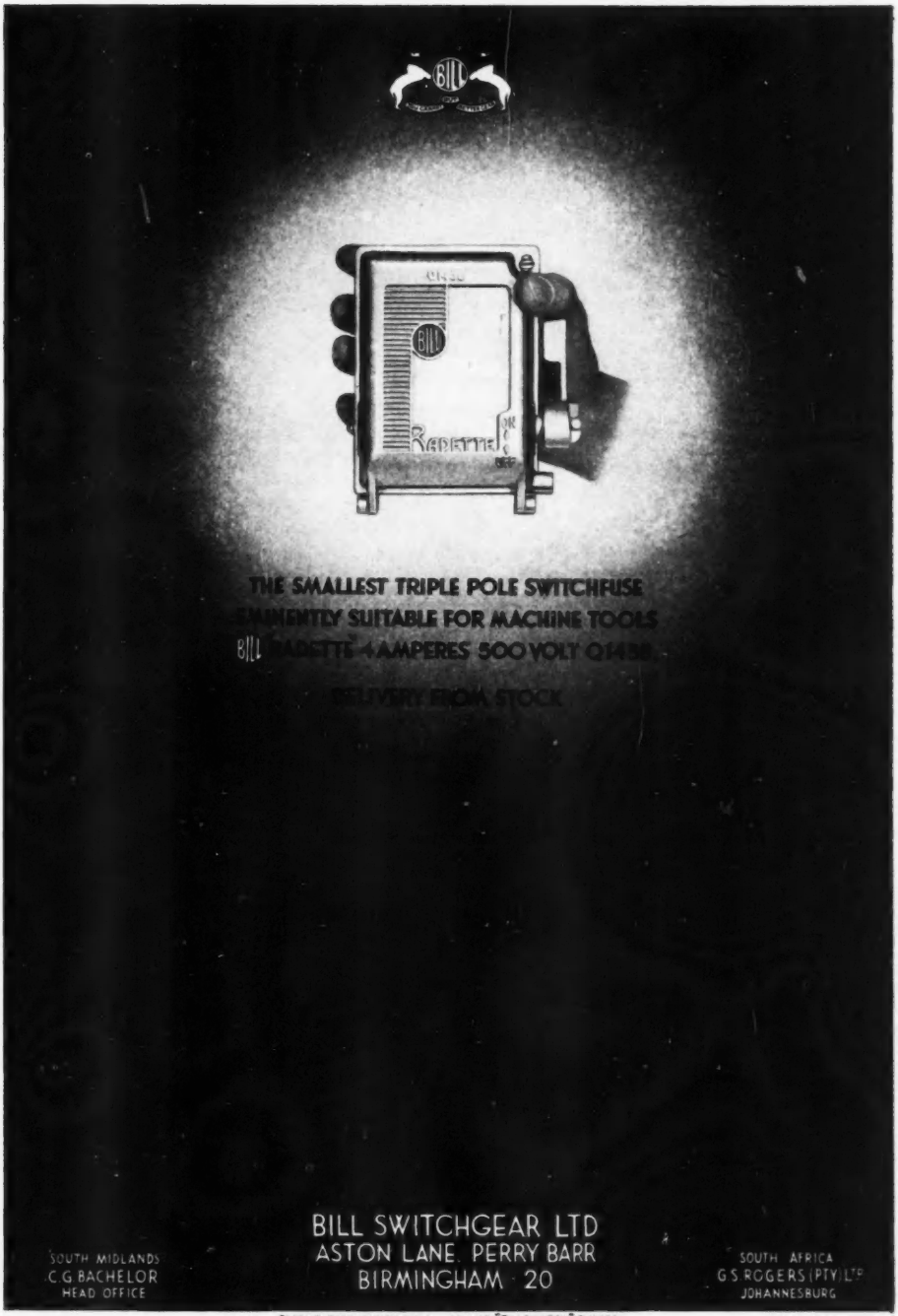
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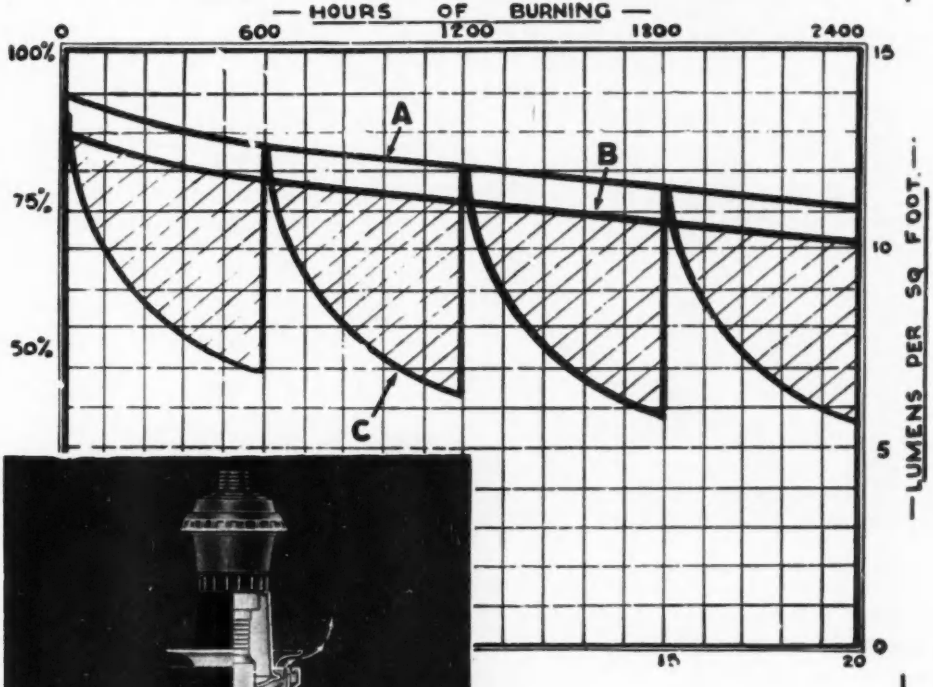

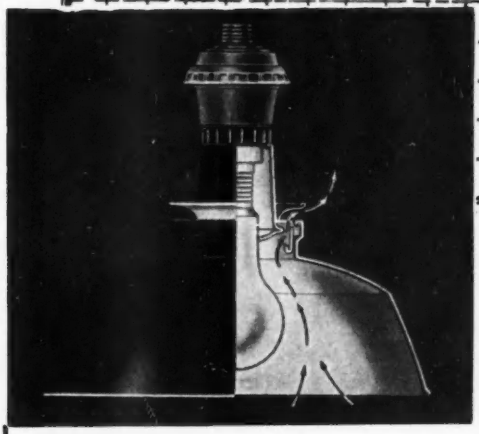

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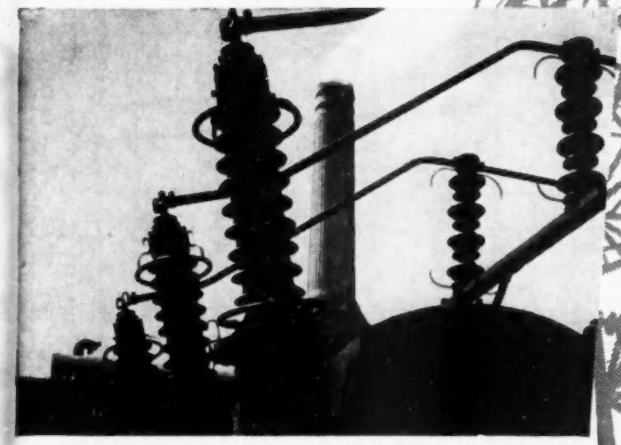
P & G BATTERIES in the public service



P & G Batteries play an important part in maintaining the efficiency of Britain's giant grid system. In countless substations where the flow of energy is broken down to comply with local needs, there you will find P & G Batteries operating vital switchgear or providing emergency lighting should the mains supply fail. The P & G service extends into many spheres, a natural result of 60 years' experience of battery manufacture and development. In round terms here it is. **1.** *Technical Advice and Specifications.* **2.** *Complete equipment and installation.* **3.** *Regular inspection and report.* A discussion of your scheme may help. We are always ready to agree that two heads are better than one.

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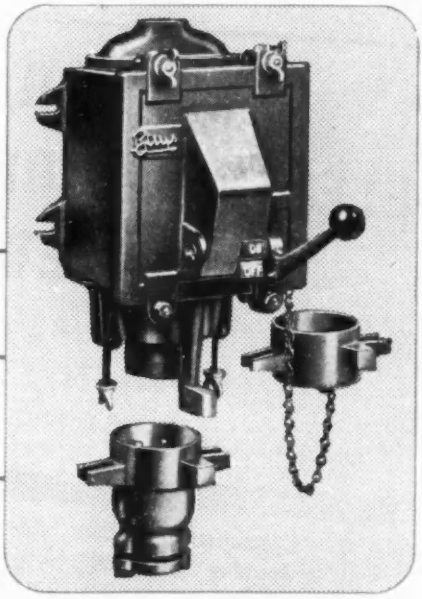
Batteries for Switch Closing, Switch Tripping, Emergency Lighting, Supervisory Control, Telephones, Supply to Auxiliaries



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VIKING fuse-switches and plugs

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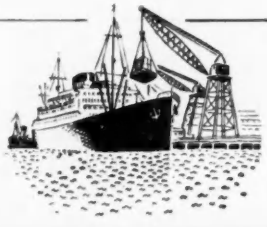

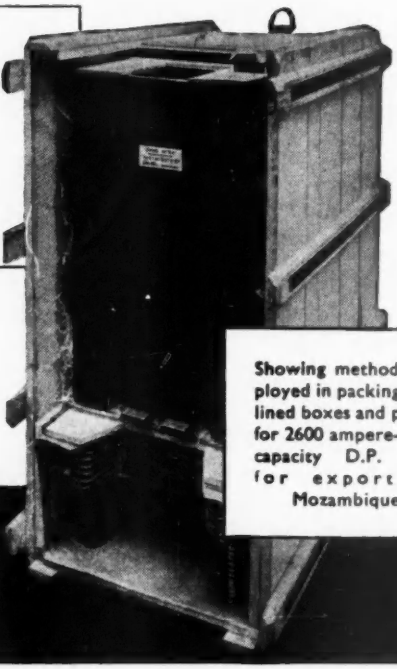

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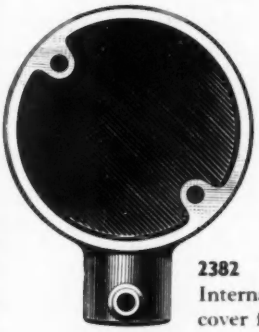

Simplex Standard Circular Boxes (without covers) conforming to B.S.S. 31 are available now, ex stock from all Simplex branches and from wholesalers

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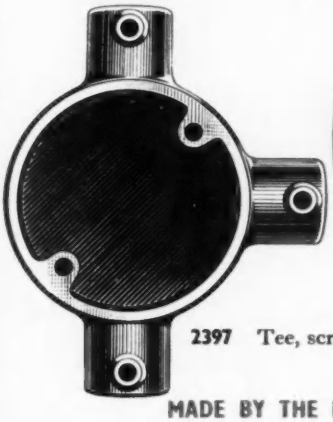

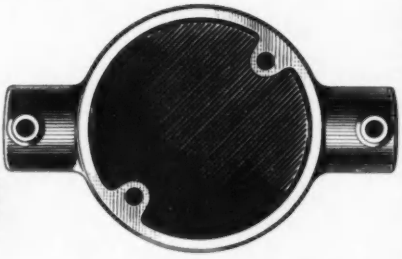

2392 Through, screwed

2397 Tee, screwed

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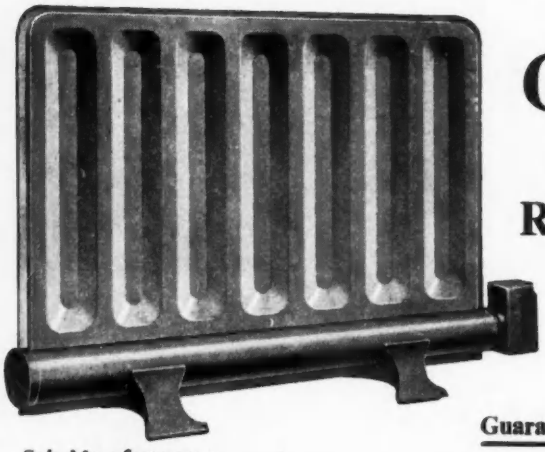

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ELECTRIC FURNACES
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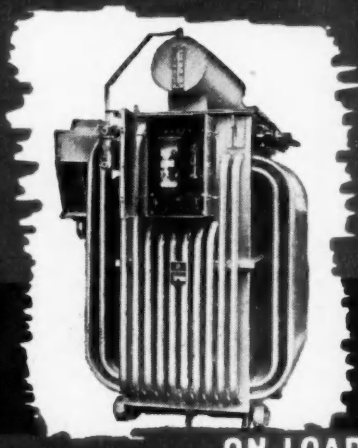

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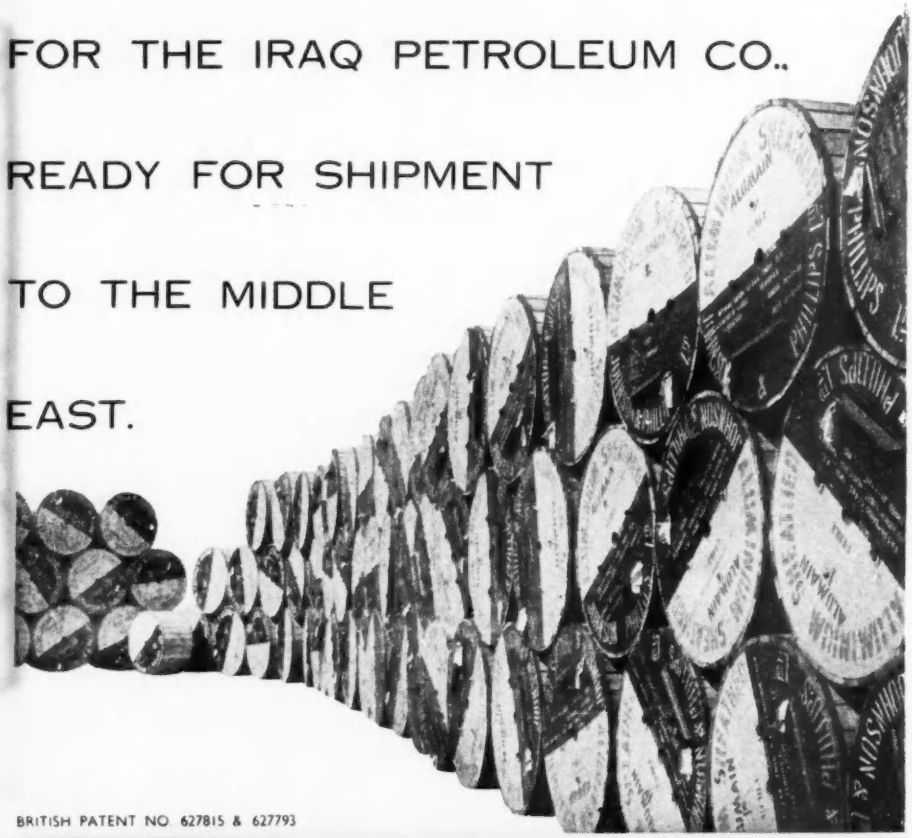

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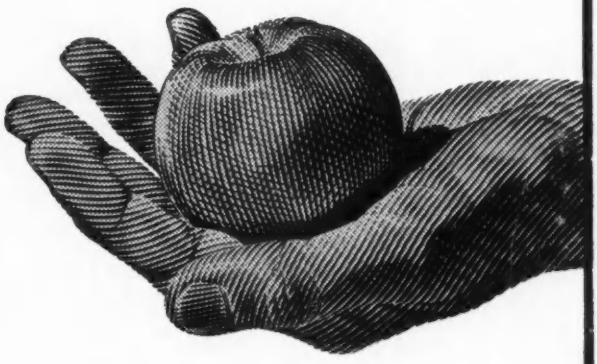

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It is easy to pick out the best fruit. The quality of electric lamps, however, is not so obvious. They all look alike. But you will always be right to stock and use Osram. They are made by the G.E.C., the largest British electrical manufacturing organisation. All the vast technical resources and practical experience of this great firm are intimately associated with Osram lamps at every stage of manufacture.

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the wonderful lamp

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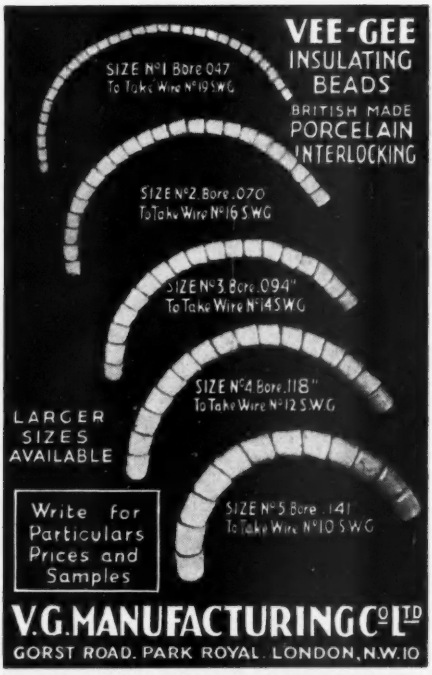

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TYPE VR/CF

Voltage Regulating Equipment

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+ 5% − 15%

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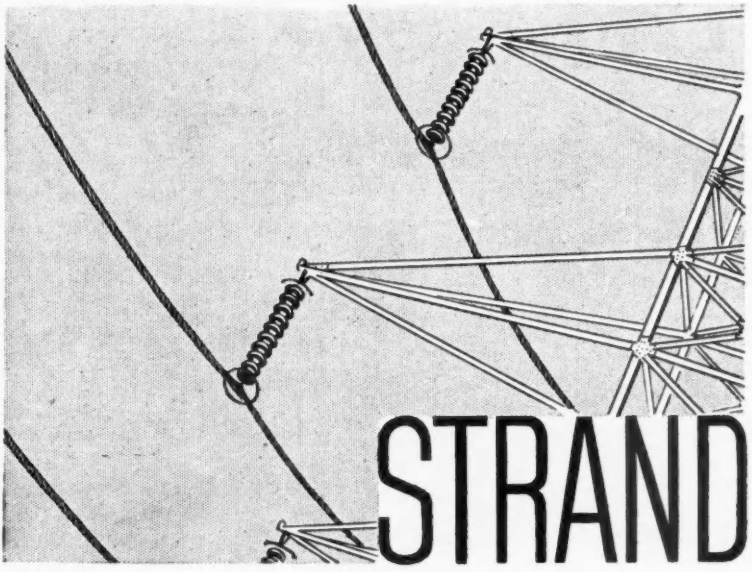

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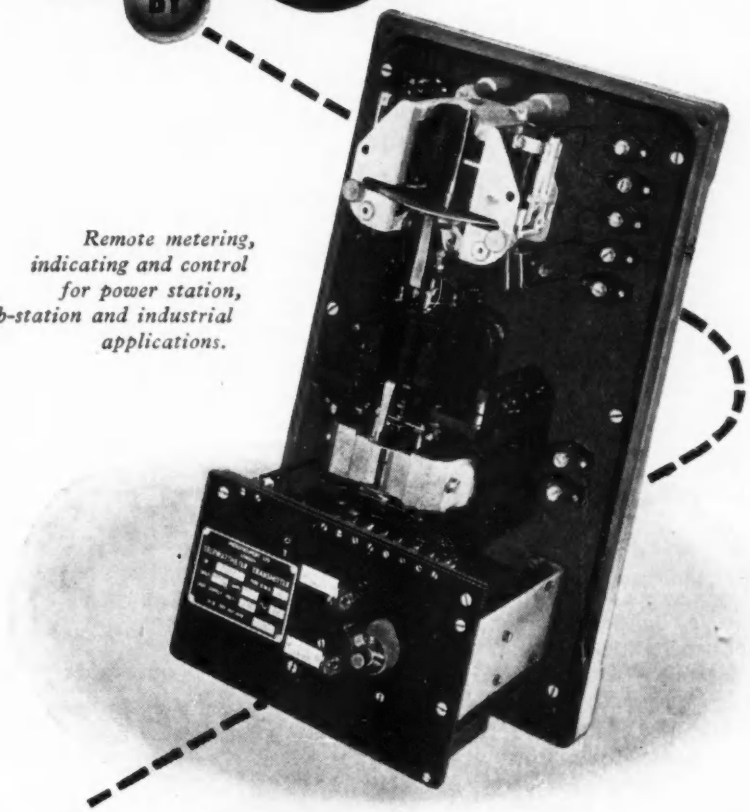
GROWTH BY DIVISION

We are one Company operating in three different fields. In this advertisement we illustrate a product of the Remote Control Division.



Remote metering, indicating and control for power station, sub-station and industrial applications.

MEASUREMENT LTD

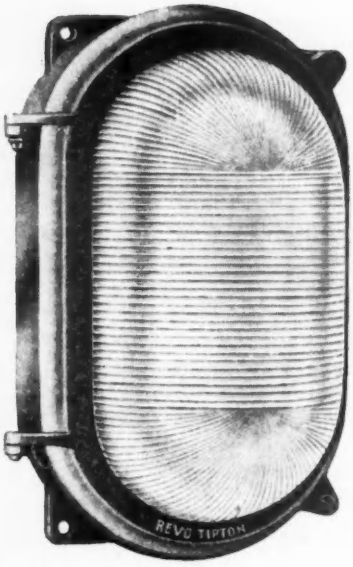
ELECTRICITY METER DIVISION, Tameside Works, Dobcross, Near Oldham, Lancs. Tel. No. Delph 291

HYDRAULICS DIVISION, 119 Union Street, Oldham, Lancs. Tel. No. Manchester Main 6432

REMOTE CONTROL DIVISION, Fitzalan St. Works, Kennington Road, London, S.E.11. Tel. No. Reliance 2406

A Company of the Parkinson & Cowan Group

A Newcomer to the REVO range . . .



C 13558

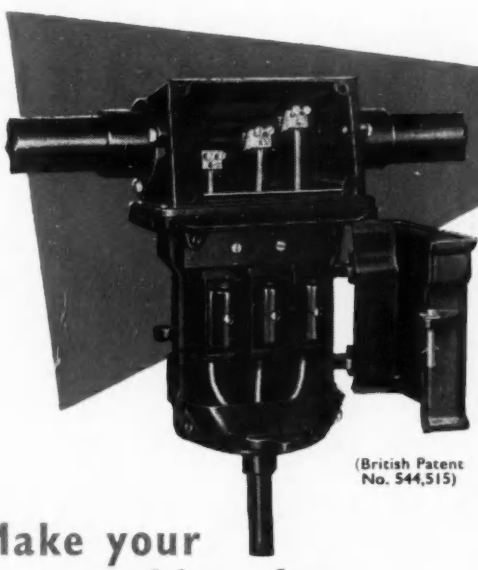
Here is an attractive addition to the wide range of Revo lighting equipment—a Bulkhead fitting of aluminium alloy—light yet exceptionally strong and durable.

Features include: prismatic glass with smooth outer surface, weatherproof door with two locking points, fixing holes for vertical or lateral mounting on brickwork, etc., etc.

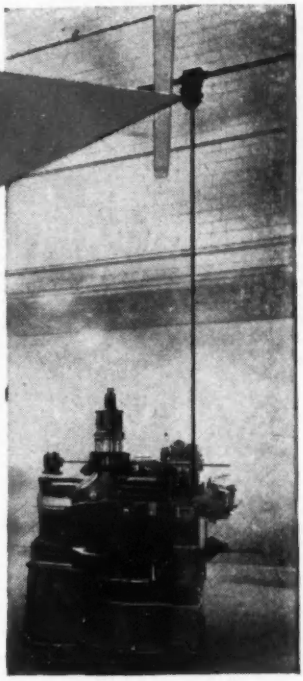
REVO

Industrial LIGHTING FITTINGS

REVO ELECTRIC CO. LTD., TIPTON, STAFFS.



(British Patent No. 544,515)



Make your machine-shop power supply FLEXIBLE

New type "Pull-Cap" Fuse Carriers and Bases

Fuse base contacts are shielded by insulating cover plates which ensure safe operation, and replacement of fuse-links is facilitated.

(British Patent No. 577848)

Simplify alterations and additions to your machine-shop layout without interruption of supply by using BICC Detachable Fused Tee Boxes. Easily installed along a cable run, they offer a feed-point system which is adaptable, simple, safe and economical.

Assembly consists of a main Cable Chamber and a readily attachable Fuse Box, rated up to 60 amps. These Fused Tee Boxes are designed for mains cables up to ·15 sq. in. with or without conduit and are equally suitable for new or existing work.

Further information is available in Publication 288U.

B.I. Callender's

DETACHABLE FUSED TEE BOXES

NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

BRITISH INSULATED CALLENDER'S CABLES LIMITED

GEORGE BURN LIMITED

TESTED SUPER-STEEL CONDUIT

CITY TUBE & CONDUIT MILLS
SMETHWICK BIRMINGHAM

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London: 2 Deansway, N.2
Liverpool: Caledonian Buildings, 14 Tithebarn St., 2
Edinburgh: 22 Shandon Place, 11

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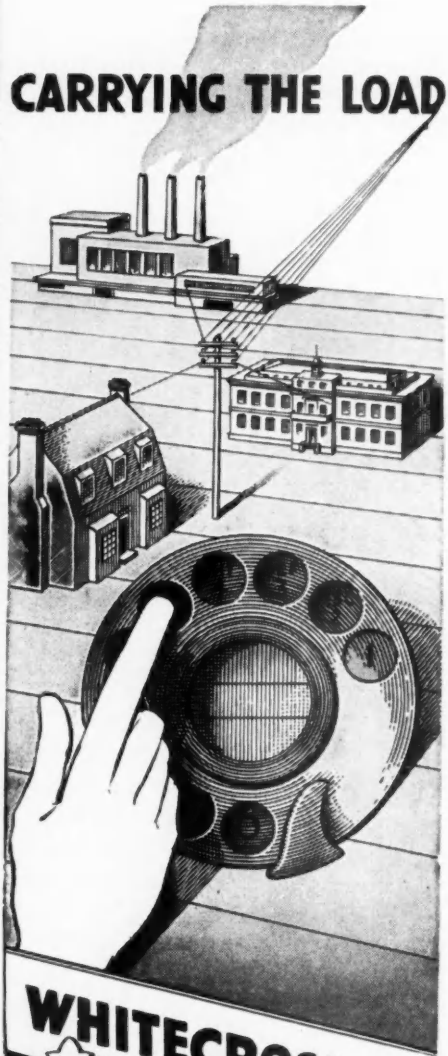
CARRYING THE LOAD



WHITECROSS

WHITECROSS conductors

THE WHITECROSS COMPANY LIMITED, WARRINGTON, Established 1864 CWS-67

Not too thick . . .

Not too thin. . .

85% of the light from a fluorescent lamp is provided by the coating of powder on the inside of the tube, and to get the highest efficiency and lumen maintenance, a critical amount of fluorescent powder is required on the tube. Too little powder will leave clear spaces between the particles and the ultra-violet radiation from the discharge will not be used efficiently; too thick a coating will absorb some of the light generated.

The viscosity of the powder suspension is the main factor affecting this powder weight and checks on coated tubes are taken throughout manufacture to avoid any drift from the desired standard.

Quality control ensures uniform excellence.

The illustration shows a viscosity test on fluorescent powder suspension, using a "Ford cup" and stop watch.

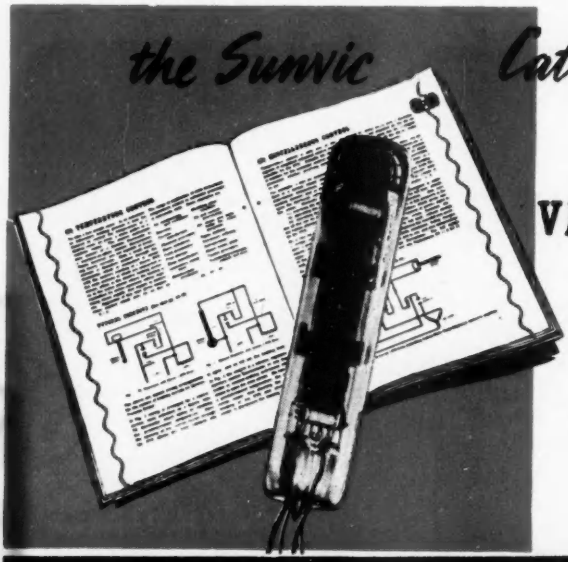
METROVICK LAMPS

Quality control - throughout

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., ST. PAUL'S CORNER, 1-3 ST. PAUL'S CHURCHYARD. LONDON E.C.4
Member of the A.E.I. group of companies

S/F 106

the Sunvic Catalogue....



HOTWIRE VACUUM SWITCHES

The non-arcing, silent, inexpensive and reliable method of switching. Glass-sealed and evacuated, these relays require but a few milliamperes for switching loads up to 10 kilowatts AC or DC, and simplify control in research and industry.

Write for your copy of this catalogue of modern TEMPERATURE CONTROL EQUIPMENT *to* . . . .

SUNVIC CONTROLS LTD.
SUNVIC HOUSE
Essex Street, Strand, London, W.C.2

SUNVIC
Member of the A.E.I. Group of Companies.

The properties of insulation and adhesion found in Connollys' range of Insulating Tapes provide unsurpassed quality, backed by over fifty years of manufacturing experience. Manufactured in ½in., ¾in., ¾in. and 1 in. widths, in 5, 10, 25 and 50 yard reels.

"BLACKLEY." The original and the best, manufactured in white only. 'LIMPET." The finest black tape obtainable.

Send for free leaflet.

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London Office: 34 Norfolk St., London, W.C.2. TEMple Bar 5506

Birmingham Office: 19 Bent Avenue Quinton, Birmingham 32. WOOdgate 2212.

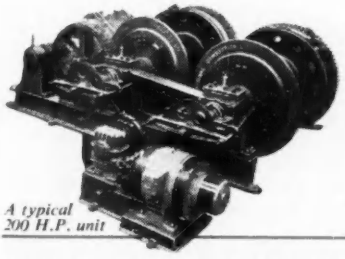
5248K

BEAUMONT DRAG SCRAPERS

reduce your outlay!

Installation of the Beaumont Drag Scraper system for coal storage shows considerable savings. Its complete simplicity and ease of operation mean low running costs as well as moderate initial outlay. Only a winch, scraper bucket, ropes and post, with sheaves or tail car are needed. Great flexibility, too, is inherent in this simple design so that any shape and size of storage area can be used to the full — yet only one operator is required.

The Beaumont Drag Scraper is one of the ICL range, which covers handling equipment for a variety of materials. Details will gladly be sent.



A typical 200 H.P. unit

INTERNATIONAL COMBUSTION LTD

ICL

London Office: Nineteen Woburn Place, W.C.1. Terminus 2833

WORKS: DERBY, ENGLAND; PORT ELIZABETH, SOUTH AFRICA; SYDNEY, AUSTRALIA

7-Range

CLIP-ON AMMETER

Type L

This model is specially designed for use with porcelain clad fuses and heavy duty conductors up to 4" dia.

Fully insulated core.

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7 RANGES

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0 — 25
0 — 50
0 — 100
0 — 250
0 — 500
0 — 1000
Amperes A.C.

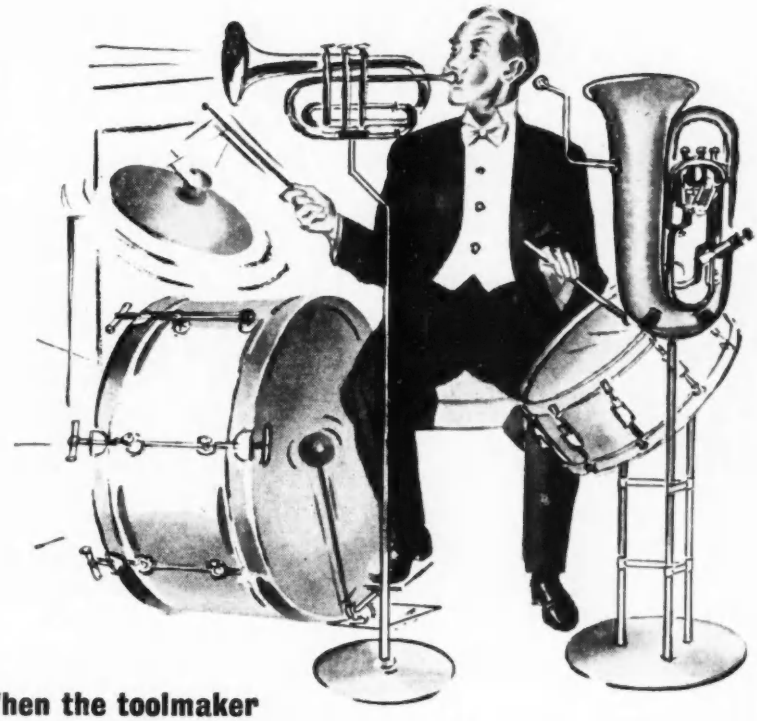
F185

FERRANTI

FERRANTI

FERRANTI LTD. HOLLINWOOD LANCS.

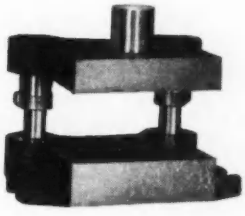
LONDON OFFICE: KERN HOUSE, KINGSWAY, W.C.2.



When the toolmaker

makes press tool sets . . . he becomes a one man brass band. (Which is clever enough in its own way but not — you must admit — not quite so pleasant to hear as a full scale band!) The toolmaker's job is making tools: why should he bother with Press Tool Sets? The cornet player doesn't usually yearn to thump the big drum. Really clever toolmakers know of course that it is better — and quicker and cheaper — to leave the Sets to Desoutter. Could we say that a bit louder? *Clever* toolmakers know that

it is quicker and cheaper to
order your PRESS TOOL SETS
from **Desoutter**



Desoutter Bros. Ltd., The Hyde, Hendon, London, N.W.9. Tel: Colindale 6346 (five lines) Grams: Despnuco, Hyde, London
CRC77

FOR

- REDUCED MACHINING COSTS
- HIGH ACCURACY TO CLOSE LIMITS
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HIGH PRESSURE DIECASTING

IN BRASS, GUNMETAL
ALUMINIUM BRONZE
MANGANESE BRONZE

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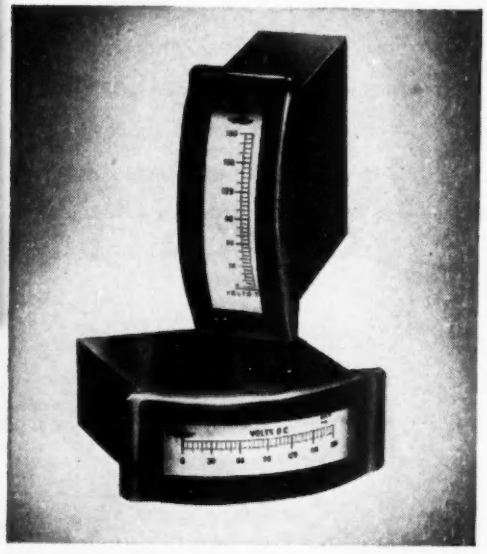
TELEPHONE WEST BROMWICH 1774 (5 LINES) TELEGRAMS ALCOP: PHONE · CABLEGRAMS ALCOP



PULLIN

VERTICAL OR HORIZONTAL EDGEWISE INSTRUMENTS

These instruments are particularly useful where space is limited or where comparative readings are to be made.

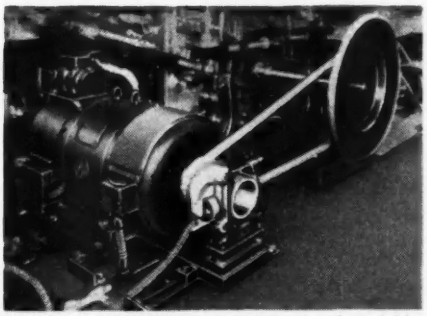
Available as moving coil or moving iron for DC or AC supply. Write for leaflet series 26 for prices and scale ranges.

MIP

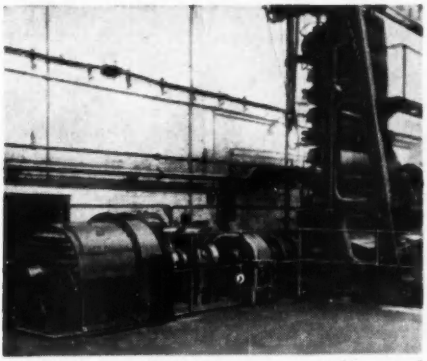
MEASURING INSTRUMENTS (PULLIN) LTD., Electrin Works, Winchester Street, Acton, W.3
Telephone: Acorn 4651

B T-H

Variable-speed
A.C. Commutator Motors



12/3-h.p., 1,440/360-r.p.m., drip-proof, variable-speed, A.C. commutator motor driving a printing press.

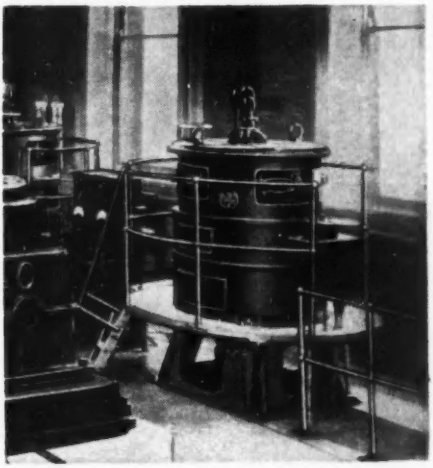


250/83·3-h.p., 540/180-r.p.m. variable-speed A.C. commutator motor driving super-calender at a paper mill.

130/44-h.p., 600/420-r.p.m., vertical-mounted, drip-proof, variable-speed, A.C. commutator motor, driving a sewage pump.

Where infinitely variable speed over a wide range is needed, the BTH variable-speed A.C. commutator motor provides an ideal form of drive. Such motors are available in a wide range of horsepowers, and operate at a high power factor, their speed is unaffected by changes in load. The numerous applications include —

Printing, paper-making, textile, laundry, pumping, and sugar-refining machinery, cement kilns; compressors and blowers, cranes, conveyors, high-speed lifts, machine-tools, rubber and plastic mixers and extruders; etc., etc.



THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

A4313

Member of the AEI group of companies

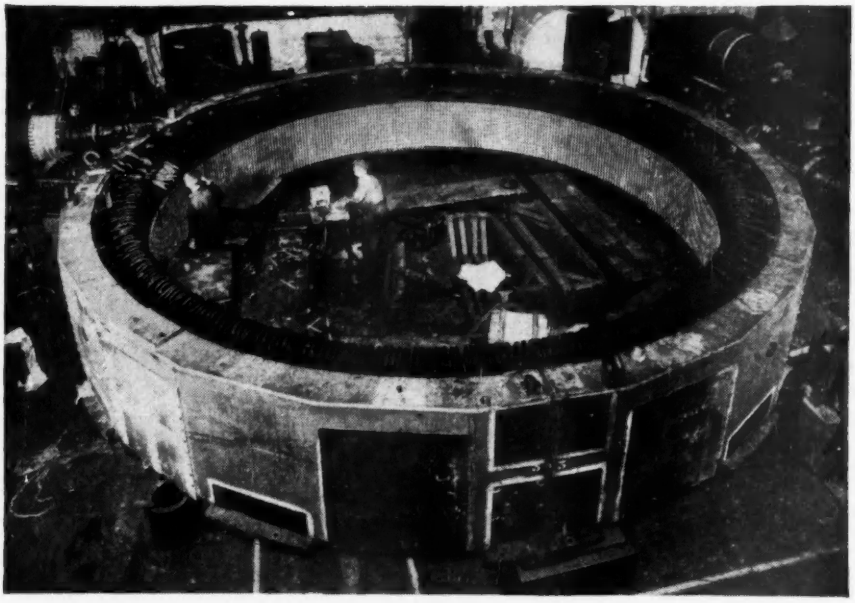


Photo: Courtesy Metropolitan Vickers Electrical Co. Ltd.
One of the three water-turbine driven generator stators—the largest so far built in this country—for a New Zealand power station. Each coil consists of a number of "Fibreglass" insulated copper strips in parallel.

FIBREGLASS
TRADE MARK

— for Electrical Insulation
Yarns, Tapes, Sleevings & Tying Cords

Experience has shown that substantial freedom from alkali is essential in glass textiles used for electrical insulation. " Fibreglass " yarn is substantially free from alkali and is **Electrical Insulation at its best.**

If insulation is destroyed, electrical equipment fails—valuable working hours are lost—important deliveries are delayed. The price of inferior insulation is a heavy one. Nothing but the best insulation available is good enough for your equipment. Since " Fibreglass " is made of glass, it is inorganic, acid resistant, and unaffected by corrosive fumes or heat—and since the glass is substantially free from alkali it is also unaffected by moisture.

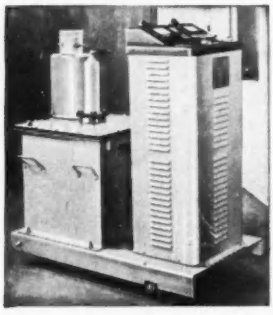
Fibreglass Limited, Ravenhead, St. Helens, Lancs. (St. Helens 4224)
LONDON OFFICE: 63/65 Piccadilly, W.1 (Regent 2115/6) GLASGOW OFFICE: 136 Renfield Street (Douglas 2687) NEWCASTLE-ON-TYNE OFFICE: 16 Dean Street MANCHESTER OFFICE: 11 Piccadilly (Blackfriars 8863) DUBLIN OFFICE: 21 Merrion Square North (Dublin 66024)
BIRMINGHAM OFFICE: Piccadilly Arcade, 105 New Street (Midland 0464/5)

This is an electrical seashell

Diala Phasianella

The delicate, attractive Diala shells are found in the warm waters of the West Pacific. Diala Phasianella (pheasant Diala) has a semi-transparent shell, less than a quarter of an inch long. The smooth, whitish surface is elegantly decorated with chestnut-coloured markings in the form of minute spots and faint lines.

Shell Diala Oils are specially designed for electrical applications. They are recommended for transformers, oil-filled switchgear and capacitors, and for general insulating and dielectric purposes. Shell Diala Oil "B" complies with the British Standard Specification 148 1951,



Seashell Oils are produced as the result of world-wide *research. This picture shows apparatus for determining breakdown voltage—one of the various tests carried out on electrical insulating oils prior to despatch.*

The Seashell range of specialised industrial lubricants, which includes Shell Diala Oils, is marketed throughout the world. There is a Seashell grade for *every* industrial use—and each of these grades is available everywhere in the same high quality. Shell lubrication engineers will be pleased to provide further information and to make specific recommendations for particular purposes.

Shell *Diala* Oil

SHELL

LEADERSHIP IN LUBRICATION

'ENGLISH ELECTRIC'

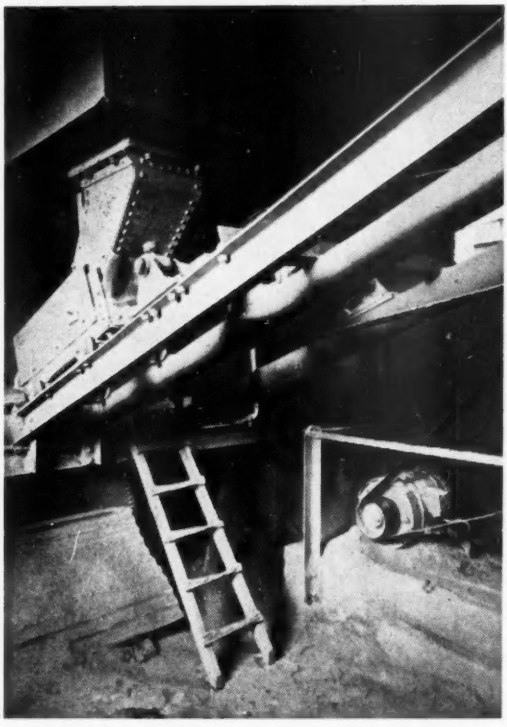
industrial motors

Designed for Reliable Service

Complete reliability under the worst conditions is an important feature in the design of every 'ENGLISH ELECTRIC' industrial motor.

The standard range which includes flame-proof, drip-proof, closed-air-circuit and fan-cooled, are all designed to give trouble-free service wherever they are installed.

Illustrated is an 'ENGLISH ELECTRIC' 6 h.p. 710 r.p.m. slip ring motor in a steel works driving a feed discharge bogey from a slag silo. Dust and grit are just two of the hazards which 'ENGLISH ELECTRIC' motors are designed to meet.



The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Industrial Motor Works, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

MI5.4

33kv
Submarine
Cable
"The South Western Electricity Board, when confronted with a difficult route such as this crossing of the river estuary at Hayle, use GLOVER S CABLES and so avoid compound migration troubles."
W. T. GLOVER & CO. LTD.
TRAFFORD PARK MANCHESTER 17
TRAFFORD PARK 2141

Gives close access even to awkward places—legs span fixed objects.

Folds to go through doorways, narrow gangways and into lifts.

Rises to working heights from 18 ft. to 30 ft.—according to model.

for work overhead

The **BEANSTALK** REGD

MOBILE HYDRAULIC WORKING PLATFORM

Quickly pays for itself by reducing costs in maintenance of plant and buildings. Manually or electrically operated. Send for folder D.1 and let us arrange for you to see a demonstration.

WM. MOSS & SONS LTD.

(*Mechanical Developments Division*)

North Circular Road, Cricklewood, London, N.W.2

Tel. GLAdstone 8080.

T.A.4269

LAWLER, AYERS & Co., Ltd.

Specialists in Tube Bending Machinery

Illustrated is Model T.3 (c) Machine, specially designed to bend electricians' conduit ⅜" to 2" diameter. This machine incorporates a special ratchet operation ensuring minimum bending effort and precision accuracy.

A complete range of conduit bending machines is available, from small machines for domestic use up to production models.

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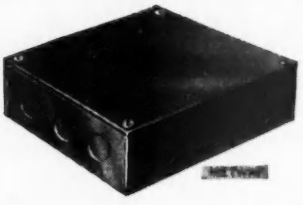
Telephone : LONdon Wall 5101

METWAY PRODUCTS

Registered Trade Mark

ADAPTABLE BOXES



PRESSED STEEL OR CAST

OVER SIXTY DIFFERENT SIZES

Send for our **92 Page** List of Conduit Fittings and Wiring Accessories. Please enclose 6d. stamp and ask for

LIST OH/31/T.E.

METWAY ELECTRICAL INDUSTRIES LTD.

KING STREET, BRIGHTON, 1

Tel: Brighton 28366. Grams: 'Metway,' Phone, Brighton

No. 2

ESSEX BEAUTY SPOTS

The illustration and information are taken from "Journeying into Essex," by W. R. Finch —printed by S. E. Recorders Ltd., Ilford.

GREENSTED

Possesses a church, the walls of which consist of Oak Logs cut in Essex Forest over 900 years ago. The inside has been modified through the centuries and includes a Tudor chancel.

ESSEX is also the home of :

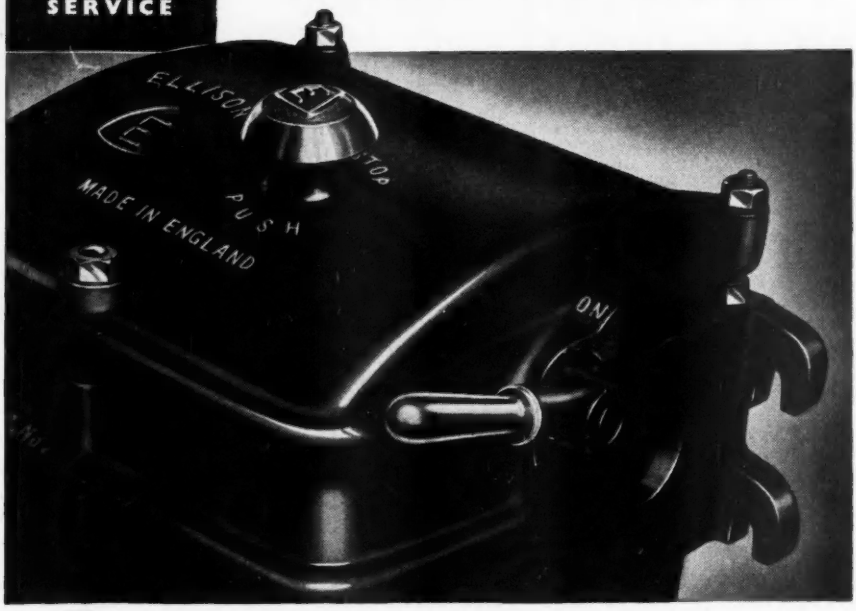
THE METROPOLITAN ELECTRIC CABLE & CONSTRUCTION Co. Ltd.

CLYDE WORKS, CHADWELL HEATH, ESSEX

Tel.: SEVEN KINGS 1810 **Grams.: METROCABLE**

THE ELLISON SERVICE

CONSTRUCTION...



ELLISON SWITCHGEAR IS ROBUST

"Ellison" electric switchgear is safe—even in the hands of a "rough" operator. The cases, contacts and mechanism are designed for hard work. If the duty demands abnormally frequent operation, or if the situation is of unusual severity an "Ellison" circuit breaker or motor starter will stand up to the job.

YOU CAN RELY ON AN ELLISON PRODUCT

TRADE (E) MARK
GEORGE ELLISON
LIMITED
BIRMINGHAM ENGLAND

SEND FOR DESCRIPTIVE LITERATURE

675

ELECTRICAL TIMES

SIXTY-FIRST YEAR OF PUBLICATION

Vol. 120 No. 3138 THURSDAY, 27 DECEMBER, 1951

PUBLISHED EVERY THURSDAY

DOMESTIC COOKER CONTROLS, *by S. F. Philpott, M.I.E.E.* 1153

FIRES IN POWER STATIONS 1159

DIARY OF THE YEAR 1160

NOTES ON WIRING, *by Megohm* 1164

OIL STABILITY 1165

PROBLEMS AND PRACTICE IN ENGINEERING 1167

STEAM GENERATION IN U.S.A., *by Vernon Walker, A.M.I.E.E.* 1168

GLASS INSULATION 1170

PREVENTING ICE FORMATION 1171

OVERSEAS NEWS 1172

PERSONALITIES IN THE INDUSTRY 1174

WORLD POWER RESOURCES 1176

ELECTRICITY IN THE COUNTRYSIDE 1177

THE BUYER'S COLUMN 1178

THE WEEK IN NEWS 1180

Electric Supply News 1184

Company Activities 1185

COMMERCIAL INFORMATION 1186

CLASSIFIED ADVERTISEMENTS 45

INDEX TO ADVERTISERS 52

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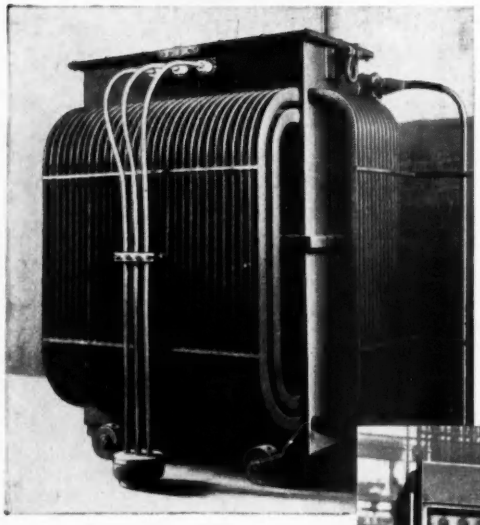
PROVIDING ESSENTIAL SUPPLIES

STATIC TRANSFORMERS AND MERCURY-ARC RECTIFIERS



(ABOVE) One of two 1,000 kVA 11 kV/400-230 volt Stepdown Transformers, at Frankley pumping Station Birmingham.

(OPPOSITE) A Mercury-arc rectifier providing a 300 amp. general load in a works Substation.

ESTABLISHED 1882

THE ELECTRIC CONSTRUCTION CO. LTD

Head Office and Works

TELEGRAMS ELECTRIC WOLVERHAMPTON — BUSHBURY ENGINEERING WORKS WOLVERHAMPTON — TELEPHONE WOLVERHAMPTON 21455 (7 LINES)

Manufacturers of Electrical Machinery, Switch and Control Gear, Transformers and Rectifiers.

Editorial

PROSPECT UNSETTLED

BY tradition, this is a season of retrospect and prospect, of surveying the year that has gone and contemplating the future. In this task it is perhaps the mellowed light of experience that makes the past twelve months seem less adverse than they appeared at the beginning of the year, when the gloomiest of prognostications were current. The outlook today bears much t..e same sombre hues, but with this difference, they are of less even tone. Some of the clouds may be very black, but there are some bright patches also, and it would be rash indeed to forecast which way will be the trend of events. Every uncertainty hinges on the international situation, for from this devolves the rearmament programme and this in turn is a major factor in the shortage of materials, which seems likely to be more acute in the coming year. But such conditions can change quickly in a few months, and perhaps when the time comes round for Christmas festivities once more, the realisation of the year will have once more falsified the worst of fears. It is for this that we hope when we wish our readers a Happy New Year.

WORTHWHILE ADDITION?

ENGINEERS in this country have experimented with the use of oxidation-inhibitors in transformer oils far less than have their colleagues in North America. Partly, no doubt, this is due to innate conservatism, partly to the ability of British manufacturers to supply satisfactory untreated oils. Two papers discussed at the I.E.E. last week were of particular value because they presented side by side, first the hopes expressed for inhibited oils, and then the proved qualities of standard oils in that very field which offers the brightest prospects for the inhibited variety: the range of small distribution units centring round 500 kVA rating. From all that was said in the papers, it is apparent that, for normal operations, the choice turns on the reduction in maintenance costs which may be expected when a more expensive inhibited oil is used, for both types will in essentials outlast the transformer they fill. There is, however, the attractive possibility that the greater oxidation stability of the inhibited oils may permit of the adoption of higher working temperatures for transformers in which they are used. Any saving of materials resulting from such effective uprating might be a worthwhile inducement to the further consideration of inhibitors in this country.

MIDWINTER - DAY'S DREAM

POLITICAL pamphlets are notoriously misleading, but when all due allowances are made for this, it would have been better if the recent Conservative publication, "Make Coal Work Harder," had never been published. True enough, fuel is one of our great problems, and more efficient utilisation continues to be a profitable line of approach, but the programme published in this pamphlet is most ill-conceived and quite impossible of achievement. There are, of course, several useful suggestions in the book, although these follow the long-familiar pattern, but what is the use of building power stations with district-heating schemes when there are no districts at hand to heat, or what would be the cost of the load-control system advocated, which would involve rewiring every consumer's installation? These are only two examples which reveal the over-optimistic approach adopted. What is more serious is the semblance of authority given to the

pamphlet by the position of one of the authors as joint secretary to the Conservative Parliamentary Fuel and Power Committee. Meteor can do no more than hope that it will be withdrawn from publication.

TRANSATLANTIC TITANS

LAST week's Christmas question on Area Board statistics came to the mind of *Meteor* when he found a list of the United States top 13 private-enterprise power companies. On a basis of consumers served, the Area Boards are well up the list in comparison, though one New York company is an out-and-out winner with two and three-quarter million customers. In the generating field, the largest American company's installed capacity is closely paralleled by that of the London Division, but in most other statistics the greater electrification in the States drives British figures well down the list. The most fruitful system listed, with the Niagara River to supply its power, sells energy equalling more than a quarter of the total that the B.E.A. and the Boards dispose of; the thirteenth largest, in Ohio, slightly leads the North-Western Board, largest British undertaking in the distribution field. Such figures by themselves perhaps have little meaning, but they can be a useful guide when evaluating those articles regarding operating experience in America which are occasionally reproduced for the interest of the British supply engineer.

COUNTRY COURTESY

METEOR has protested from time to time in these columns that he loves the countryside as well as the next man. Perhaps it was this useful note of autobiographical detail which persuaded the editor of an architectural contemporary to appeal to him for support in the condemnation of overhead wires. Evidence offered was a reprinted article containing a score or so of photographs carefully selected for the convincing, though hardly fair, views they presented of wires and cables obscuring the landscape. In at least one case the cables had been so inconspicuous as to demand blatant retouching of the print. The real cause for offence, however, lies in the text that accompanies these photographs: an unsympathetic attitude is most unfairly inferred of engineers. It is a welcome coincidence that the answer is given to these inferences by the National Parks Commission, with whom the authors of the article would no doubt side. This Commission, official guardian of this country's wilder natural beauty, having studied the problem (a tiresome step, too frequently omitted by critics), agrees that overhead lines are often a necessary corollary of electric power for the country dweller. Throughout its recently published report, it makes generous acknowledgment to the eagerness of the B.E.A. to help. And in treating the problem in this reasonable manner the Commission exhibits a standard of courtesy that those responsible for the more hysterical diatribes against economical electrification might do well to emulate.

GAS SIMILARITIES

so cherished a rival as the gas industry does not lose its interest because of the impingement of nationalisation on its development, but rather gains more, and the recently published report of the Gas Council for its first full account-year of working has received every attention in this office. The trouble has been to find a noteworthy difference between this maroon-jacketed report and its vermillion-covered electrical counterpart. Retarding of plant installation by steel shortages; need for greater allocation from capital investment programme; delays in construction imposed by planning procedure; lessened distribution losses. It all makes one feel very much at home, and, to add to that impression, there is now extended reference to Grids (yes, capital and all!). But the increased usage was about 6% for a period when electricity marked up a 12·3% advance. So the younger industry is still growing more rapidly than grandpa, in spite of the mutual resemblance imposed by the troubles of the times.

Meteor

Domestic Cooker Controls

A REVIEW OF THE OPERATIONAL PRINCIPLES OF THE MANY TYPES AVAILABLE

By S. F. PHILPOTT, M.I.E.E.

CONVENTIONAL electric cookers consist of two main sections, hot plates and oven, and provision must be made for varying the temperature of each unit according to the requirements of the class of food being cooked.

So far as the hot plates are concerned, these should ideally give a range of temperatures from simmering to boiling, while oven temperatures need to be adjustable between about 200 and 550 degrees Fahrenheit.

The heating elements of both plates and ovens are composed of suitably mounted coils of nickel-chrome resistance wire which are heated by the passage of the current through them. In the majority of cases, the elements are connected directly to the mains, but in certain designs the element is of very low resistance and a low voltage heavy current is supplied to it from a transformer. The latter type is, of course, only suitable for a.c. supplies. The other types are suitable for d.c. or a.c. and the loads are non-inductive.

In this country, and, indeed, in the majority of overseas markets, cookers are connected to a two-wire supply—mostly single phase a.c., but in America and some other parts of the world, a three-wire single-phase supply is used, the voltage across the outers being twice that between either of the outers and the middle. This arrangement by which two different voltages are available to each heater point gives a greater flexibility of control than is ordinarily possible with the two-wire supply. Unless otherwise mentioned the cookers and controls dealt with in this article refer to the single voltage type as commonly used in this country.

Principles of Control

When a heating element is switched on, the temperature rises and continues to do so until the heat loss by radiation or convection is equal to the heat input. The latter is a function of the wattage applied to the element, i.e., of I^2R.

The amount of heat which is developed by the heaters depends on the wattage and the length of time for which the elements are energised.

From the above it will be seen that the heat developed in an element can be varied in any one of the following ways: alteration to the applied voltage, alteration to the resistance, or control of the time the element is in circuit.

Except in the special cases mentioned above where a three-wire supply is available, and where a low voltage the element is supplied from a transformer, it is not practicable to control the voltage applied to the complete element, and cooker controls are, therefore, mainly divisible into three classes—(1) those in which the effective resistance of the element is altered, thus altering the value of the current, (2) where the time of application of the current is variable and (3) a combination of the two.

Variation of Effective Resistance

The working conditions and constructional requirements make it impossible to provide anything of the nature of a continuously variable (e.g., sliding) resistance, and elements are, therefore, made in two or three sections, the ends of which are brought out separately, and switching is arranged so that the number of sections in use can be varied and/or relative connections between the sections of the element may be changed. One commonly used arrangement is the series parallel connection using an element with two separate sections. In the high temperature position of the control switch, the two elements are connected in parallel, in the medium position one element only is in circuit, and in the low heat condition, the two elements are in series (see Fig. 1).

For this circuit a four-position switch is used, the fourth position being "off." It will be seen

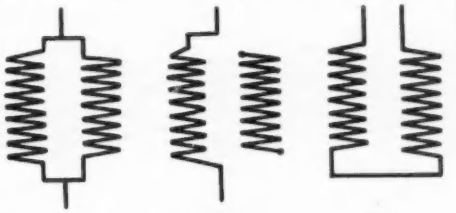
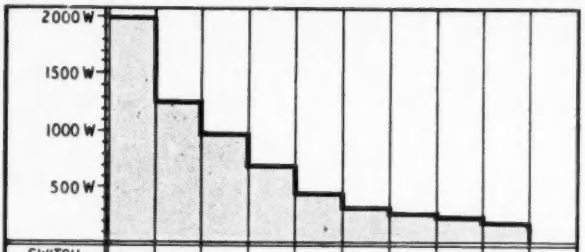


Fig. 1. Two-section elements give three possible heating levels with simple series-parallel control



SWITCH POSITION	9	8	7	6	5	4	3	2	1	OFF
TOTAL LOAD WATTS	2000	1250	965	705	420	285	245	220	170	
OUTER TUBE	750	–	–	235	235	–	15·5	–	40	
MIDDLE TUBE	965	965	965	185	185	–	19·5	50	30	
INNER TUBE	285	285	–	285	–	285	210	170	100	

Fig. 2. Heating powers obtainable by using a three-element hot plate in conjunction with a 10 position switch is here shown graphically. Fig. 3 sets out the connections required for this nine-heat range

that if the element is made with two unequal sections, an additional control position can be incorporated by using the second section by itself. This calls for a five-position switch. If the number of sections in the element is increased to three a much wider range of temperatures becomes available.

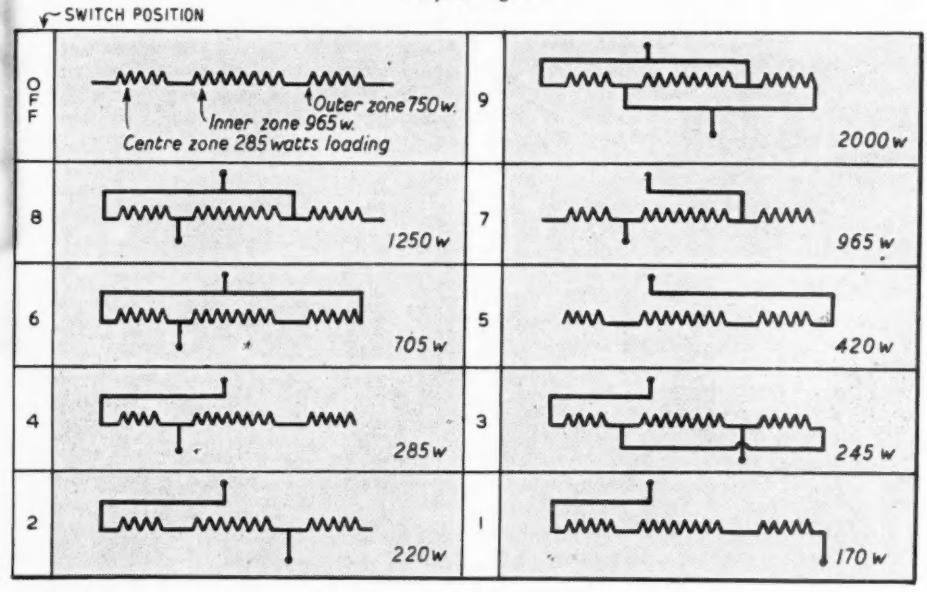
Fig. 2 shows the wattages obtained with a Backer hotplate with three sections loaded 965, 750 and 285 watts respectively. This is designed for use in conjunction with a "Diamond H" 10-position switch. Fig. 3 shows the connections for each position. A feature of the arrangement is that the junctions between the sections of the elements are never broken. The switch breaks both poles in the off position. When 9 heats is more than required, certain circuits are omitted and 8 and 6 position switches used.

Switches

Although the various circuit arrangements mentioned above can be obtained by the use of single way and two-way toggle switches, the method is neither simple, cheap nor foolproof, and rotary switches are invariably used for cooker control. The desired circuit is obtained by turning the handle to the indicated position.

Two types of switch are in general use—the quick make-and-break type which is suitable for d.c. and a.c. circuits, and the slow break which can only be used where the supply is a.c. A.C. switches are more simple in construction, smaller, cheaper and more quiet in operation than the quick make-and-break type and are being increasingly used.

Fig. 3. Circuit arrangements for a three-element plate used in conjunction with a 10 position switch. Compare Fig. 2



Both types are available for single-pole or double-pole switching. As it is usual practice to fit a separate main switch unit for each cooker, single-pole switches are more widely used of the two, but double-pole switching is obligatory in some countries.

A quick make-and-break rotary switch consists essentially of (1) a number of fixed contacts, mounted in a base, and provided with terminals. (2) A set of moving contacts, or blades mounted on a central spindle. (3) A detent mechanism to give a quick change from one position to the next, and (4) the handle and cover.

The fixed contacts are arranged in two tiers as shown in Fig. 4 and the moving blades are arranged in two corresponding tiers. It will be seen that it is possible for fixed contacts to be placed either in the top or in the bottom or in both tiers. In like manner the moving blades may have two arms, diametrically opposite, two arms at right angles, or three arms. Without going further, it will be seen that there are numerous possibilities in circuit arrangements.

The a.c. switch depends for its action on the fact that in a non-inductive a.c. circuit, such as is found in cookers, the voltage and current fall to zero simultaneously at each half cycle, and any arc formed in breaking a circuit will be then extinguished irrespective of the speed of break. A slow break is, in fact, preferable, in order to limit the arc.

The elimination of the quick make-and-break mechanism greatly simplifies the switch, and while there are a number of different designs, they are mostly based on a construction in which there are several fixed contacts, usually of silver, moving contacts also of silver, which are mounted on a leaf spring and a cam on a spindle which causes the moving members to move to or from the fixed ones, and an indexing mechanism to ensure that the handle is moved through 90° at each movement (for a four-position switch).

If the basic connections for a three-heat series parallel circuit are examined as in Fig. 1, it will be seen that all that is required is a single-way and one two-way switch with off position. In a rotary switch, this can be done readily by using three arms and three contacts, or two arms, one with one fixed contact and one with

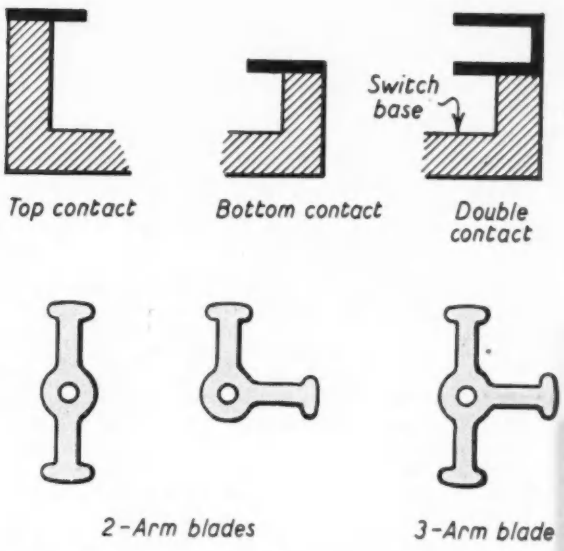
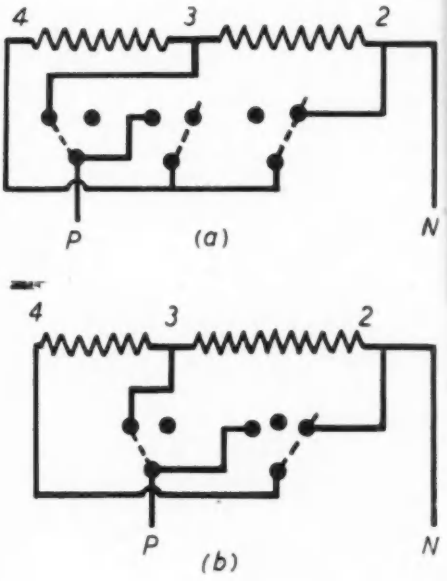


Fig. 4. These types of contact and blade are used in the rotary quick make and break cooker switches described in the text

Fig. 5. Single-pole a.c. series-parallel switch connections (a) using three single-way switches (b) using one two-way and off, and one single-way switch

Sequence is in each case (1) off (2) high P-3 4-2 and N (3) medium P-3 (4) low P-4



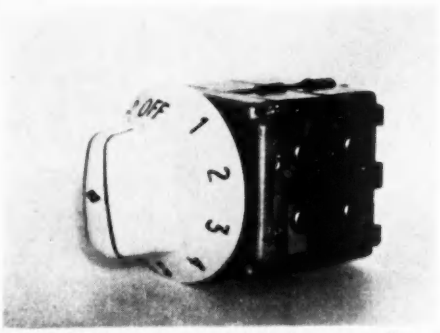


Fig. 6. Double pole a.c. switch for nine different heat values (Diamond H)

two contacts. An off position is required to be provided in between.

Fig. 5 shows the circuit arrangements for a single-pole three-heat switch. Double-pole switches are also made, by the addition of a further pair of contacts. Switches working on a similar principle are made for up to ten positions, i.e., 9 heats and "off," using only two moving arms and 4 fixed contacts. Fig. 6 shows a "Diamond H" 9-heat a.c. switch.

Control by Time

In the method of control by switching as dealt with in the previous section, the current though variable according to the effective resistance of the element flows continuously. In the system of control by the time of application of the heat, the value of the current, usually but not always, remains constant and is switched on and off automatically at intervals according to requirements.

There are two distinct systems of automatic control in use, respectively the thermostat and the "energy regulator."

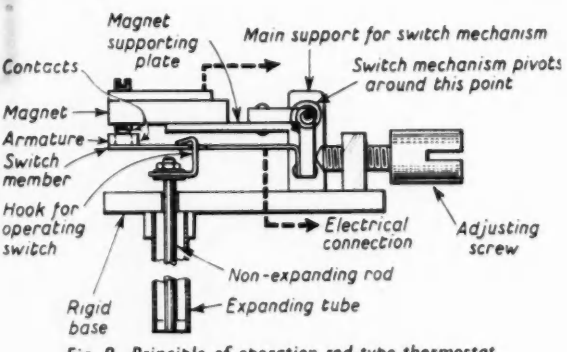


Fig. 8. Principle of operation rod-type thermostat

Thermostats

The thermostat is in effect a temperature responsive switch which opens automatically when the oven reaches the temperature to which the thermostat has been set. As soon as the oven begins to cool the thermostat recloses the element circuit and the cycle is repeated continually as long as required. The difference between the temperatures at which the thermostat closes and opens the circuit is known as the differential. A close differential gives a level temperature curve. A wider differential gives a less regular curve but less rapid wear of the thermostat parts. Some thermostats are made with two sets of contacts for use with a two-circuit oven element. One section is used for bringing the oven rapidly nearly to its initial heat and is then cut out of circuit by the thermostat, the final build up of temperature and the control being carried out on one element alone.

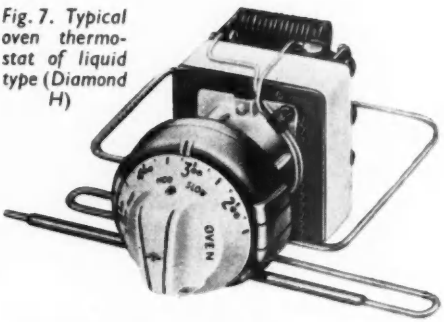


Fig. 7. Typical oven thermostat of liquid type (Diamond H)

Thermostats depend for their action on the fact that most substances expand with heat, some more than others. Thus if one contact of a pair is mounted on a member which will move under the influence of heat, and the other is mounted on something which is not so affected, the points can be made to separate when the temperature rises.

Thermostats used for cooker control are of two main types, those which depend on the expansion of a liquid, and those employing a solid metal expansion member.

A typical example of the first type is shown in Fig. 7. It is operated by the expansion of a fluid of high heat stability contained in a phial, capillary tube and flexible bellows assembly, the expansion and contraction of which is made

to operate one or two pairs of contacts connected in series with the oven elements.

The bellows is housed in the head which is fitted on the switch panel of the cooker while the phial is mounted at any convenient point within the oven.

The bellows, phial and tube are a self contained unit and the tube can be bent as required without affecting the accuracy of the thermostat.

The temperature setting dial, moves the bellows bodily, thus varying the amount of travel required to open the contacts. Correction for ambient temperature changes is incorporated.

Rod-type Thermostat

The rod-type thermostat depends for its action upon the fact that some metals expand under heat more than others so that the difference in length between two pieces of dissimilar metals varies with the temperature.

The temperature sensitive element consists usually of a nickel iron rod such as Invar having a negligible coefficient of expansion, contained in a brass or bronze tube having a relatively high rate of expansion. The contacts are arranged so that they are normally closed, but are opened when the difference in length between the two members reaches a pre-set value. In the case of cooker thermostats the operating temperature can usually be set at any figure between 200 and 550° F. How this principle is applied in the Satchwell thermostat (The Rheostatic Co. Ltd.) is shown diagrammatically in Fig. 8.

Fig. 9 shows an actual instrument. It is mounted in the rear of the switch compartment of the cooker so that the stem projects into the back of the oven near to the top and is connected to the control knob by means of a coupling rod fitting into the socket at the front of the photo. The control knob incorporates a pilot lamp which lights when current is flowing through the elements.

Fig. 10 shows another form of rod type thermostat in which there is a flexible coupling between the control knob and the Sunvic thermostat itself.

Thermostat Circuits

The simplest form of thermostat circuit is that in which the thermostat has only a pair of contacts which are connected in series with the oven element.

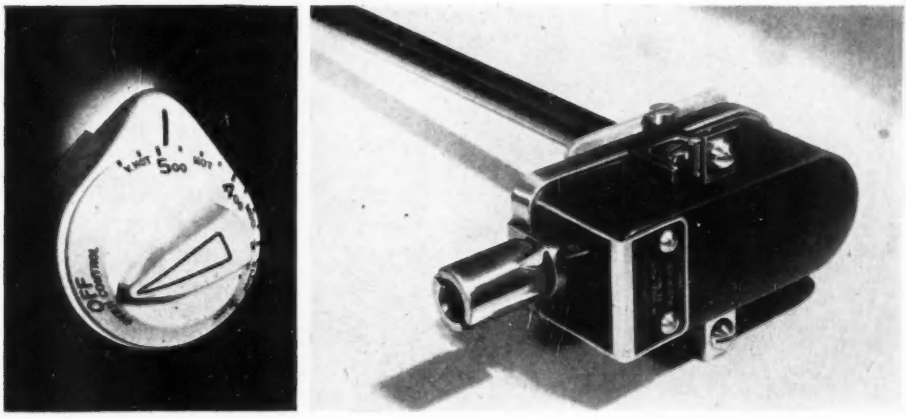
In some cookers it is the practice to provide two sets of elements, both of which are in circuit during the initial pre-heating of the oven. One set is switched out when the desired temperature has nearly been attained, leaving the remaining element in circuit to bring the oven to the final temperature and to maintain the heat.

Thermostats for this purpose are fitted with two independent single-pole switches arranged so that the one controlling the pre-heating or "boost" element opens at a temperature of about 50° F less than the other.

A further type of thermostat is required when the oven has two sets of elements, one at the bottom of the normal type, and another of the open type at the top. The oven may be used in three different ways: (1) with both top and bottom elements in use for quick heating of the oven. (2) with the bottom elements only for baking and (3) with the top element only—at full heat—for grilling.

Thermostats for this form of control must have two pairs of contacts—one for each

Fig. 9. Typical rod-type thermostat, with control dial shown on the left (The Rheostatic Co.)



element and also a switch to cut out the "bake" element when it is desired to use the grill (or broil) only.

The switch may be incorporated in the thermostat, the control dial being turned to "Broil" position to operate the switch, or by the use of a separate oven selector switch.

Pilot Lamps

Most thermostats are fitted with a pilot light to show when the elements are in operation. A common method of arranging this is to connect a resistance in series with the load of such a value as to give a volt drop of about 3½ volts, and then to connect a small M.E.S. bulb across the resistor. The bulb is often fitted beneath the translucent portion of the front of the instrument. The wattage lost in such a resistor is quite appreciable on an oven load, and modern practice is tending towards the use of a small neon tube connected in series with a resistor directly across the mains, and consuming but a fraction of a watt.

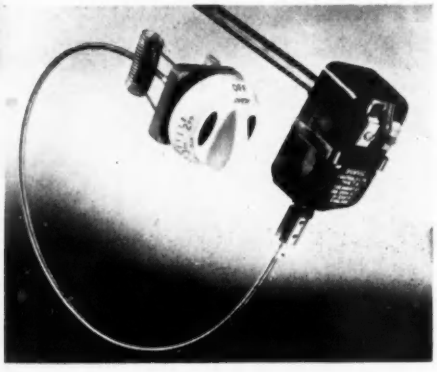
Thermostat Mounting

In the rod type thermostat, the temperature sensitive element must project into the oven parallel with the front but, for convenience, at the rear of the oven.

The liquid operated thermostat is more flexible. The capillary tube is easily bent and the phial can be placed in any convenient position in the oven.

The actual temperature within an oven varies according to the proximity of the elements, radiating surfaces, ventilation holes, etc., and so the temperature of the effective part of the oven, where the majority of the cooking is done, may not necessarily be the same as that in the vicinity of the thermostat.

Fig. 10. Rod-type thermostat with flexible connection between instrument and control dial (Sunvic Controls)



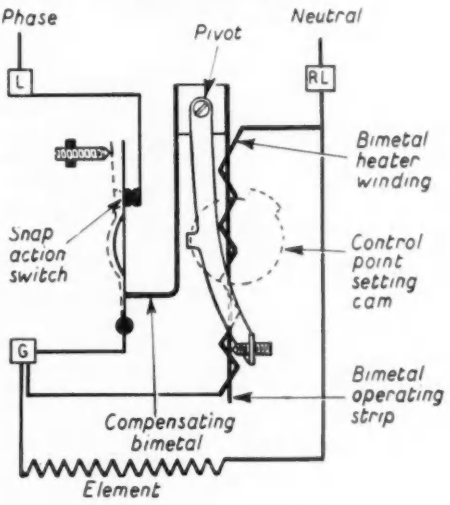
Means are therefore provided in most thermostats for offsetting the calibration in accordance with temperature tests made under working conditions to ensure that the temperature indicated on the dial is that of the working part of the oven, and not that of the thermostat element. It is important to realise this fact in checking the performance of a thermostat.

Energy Regulator

Thermostatic control is not readily applicable to hot plates and where automatic control is required, an "energy controller" is usually employed.

In the latter system, single circuit heating elements are used, and are switched on and off

Fig. 11. Principle of operation of an energy regulator (Simmerstat)



to maintain the heat, but unlike the thermostat system the switching is done continuously and regularly. The element is switched on for a certain length of time then off for another controlled period and so on. The ratio of time on to time off, which can be varied by turning the control knob, determines the ultimate temperature of the plate. The plate temperature begins to fall as soon as the current is switched off, but not very fast on account of the heat storage capacity available, and the frequency of operation, about two cycles a minute, is such that the temperature differential of the plate is small. The best known example of this type of control is the "Simmerstat."

The principle of the Simmerstat is shown in Fig. 11. The ratio of the time during which the

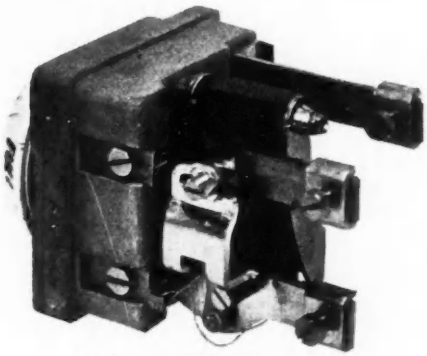


Fig. 12. Sunvic Simmerstat with cover removed

contacts are closed, to the total time of the cycle determines the average input. This ratio is controlled by the cam. If this is turned until the contacts remain closed with the maximum deflection of the bi-metal, the power will be permanently on. If it is turned in the opposite direction until the contacts are opened with the bi-metal cold, the power will be permanently off. Between these two limits the input is continuously adjustable. Fig. 12 shows a Simmerstat with cover removed.

Since the same voltage is applied to the regulator as is applied to the load, any variation will affect the two similarly, so that the average input is independent of the applied voltage over a wide range—up to about 15 per cent. deviation from standard.

FIRES IN POWER STATIONS

Some observations on present-day American practice

AN account of the fire experiences (and the precautions against fire developed as a consequence) of the Consolidated Edison System in America, is contained in an article by H. A. Bauman and W. E. Rossnagel in the December issue of *Electrical Engineering*.

The article systematically deals with the potential fire causes, beginning with spontaneous combustion in coal storage dumps and coal bunkers, and going on to oil fire hazards in transformers and switchgear.

Coal fires are usually caused by permitting the coal to come into easy and intimate contact with oxygen in places where the resultant heat of oxidation cannot readily escape. Thus, in storage, coal should be compacted in dense layers to prevent access of oxygen or sealed off from contact with the air. In coal bunkers, care should be taken in the design to provide a minimum of flow interruption and stagnant areas. Round cross sectional shapes should be used as far as possible and in any converging section, one vertical side should be retained to prevent coal "arching".

A potential fire hazard is always available where high steam temperatures are in use due to the possibility of lubricating oil coming into contact with high temperature surfaces. This type of oil ignites at temperatures above 750° F.

In machines using hydrogen cooling, the fire hazard within the alternator is greatly reduced, as hydrogen by itself cannot support combustion. Thus fires are unlikely to start in these machines due to winding faults. Care should, however, be taken at points such as stator terminal bushes, as small hydrogen leaks leading to local explosive mixtures may be present.

The tendency in switchgear practice is to avoid as far as possible the use of oil within the power station, and to install air-blast circuit-breakers as far as possible.

Fire Fighting

There are many types of fire extinguishing equipments available. Vapourising liquid extinguishers, utilising carbon tetrachloride or chlorabromomethane are well suited for dealing with fires in exposed windings of motors or other electrical apparatus. They can also be useful on small oil fires in restricted locations.

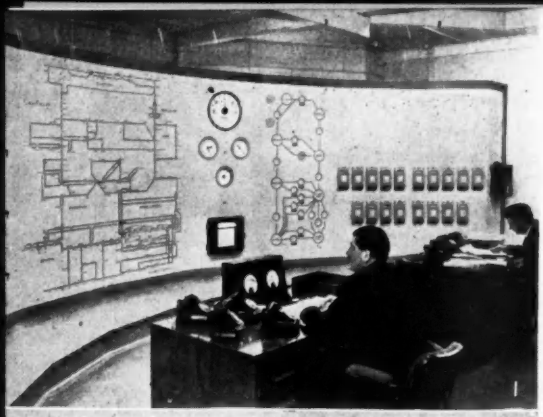
Carbon dioxide extinguishers are recommended particularly for switchboard fires where severe incidental damage to delicate equipment may be caused by liquid extinguishers.

For working on h.t. fires the Edison Co. has developed high-velocity water-fog equipment using a cylinder of nitrogen at 2,200 lb/sq in. as a pressurising agent and a specially constructed atomising nozzle.

Dry chemical extinguishers are becoming popular and have been found more satisfactory for small to medium oil fires than the foam equipment. They are however unsatisfactory for deep seated fires as they possess small cooling properties. There is, however, nothing like foam for the large oil fire. This can be either mechanically or chemically produced and requires special apparatus. It is however considered that the high-velocity water fog from a $1\frac{1}{2}$ or $2\frac{1}{2}$ in. fire hose is the best all-purpose, heavy-duty, portable fire equipment for use on medium to large size fires in power stations.

DIARY OF

A Record of Britain's Festival ings that make



FOR most people 1951 will be marked as Festival Year, the culmination of many months of planning and expectation. Electricity naturally had a big part to play in the story of progress then presented, but as well as reflecting history, the industry was busy making it and a review of our pages during the past twelve months shows how eventful the period has been.

Early in January, the worst stages in the winter coal shortage were reached, and our columns noted the switch-over in B.E.A. advertising to meet the new position; shortly afterwards came new restrictions on advertisement lighting. Something of the gloomy atmosphere introduced by such evidence of difficulties is offset by the story of the new National Grid Control Centre, disinterred from its tube shaft and established in prefabricated buildings near St. Paul's.

The then Chancellor of the Exchequer, Mr. Gaitskell, informed a Press conference that the previous year had seen a 15% increase in exports, manufacturers of electrical machinery and refrigeration equipment being major contributors. A "first" registered at about this time fell to the Illuminating Engineering Society, with the inauguration of the Trotter-Paterson memorial lectures.

February found us noting a B.E.A. extension of its concession to industrialists who installed stand-by generating equipment; another sign of the times was the announcement by the Minister of Supply of cuts in supplies of copper, earliest of many pronouncements on metal shortages which were a feature of the year. Planning for the future was evidenced by the publication of the leading details of the B.E.A.'s 275 kV superimposed grid, covering expected developments up to 1960.

A notable electrical occasion during the month was the golden jubilee dinner of the Electrical Contractor's Association. Mr. R. A. Butler headed an imposing list of guests, and he delivered a message of congratulation from Mr. Churchill. Mr. P. G. Wallis, the president

1. *National Grid control came above ground*
2. *British engineering equipped Castelo de Bode in Portugal*
3. *Festival floodlighting attracted crowds in London*
4. *Sir Henry Self was an imposing* B.E.P.C. *president*

THE YEAR

Year and the Electrical Happen-it Memorable

of the E.C.A., reviewed milestones in the history of the Association.

February also saw the publication of a report on the British Standards Institution, its main recommendations being for increased government aid and increased industrial subscriptions. The official committee submitting the report approved of the existing B.S.I. organisation.

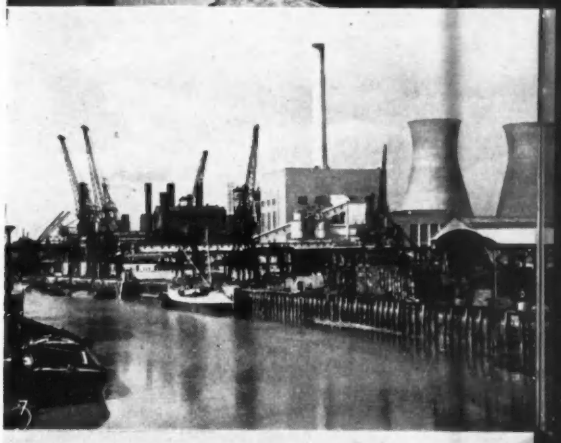
March proved rather quiet so far as activity in the electrical field was concerned. A new wages scale for journeymen electricians was announced early; while at the end of the month came a report from the committee set up to review the general problem of British railway electrification. The type recommended was was 1,500 V d.c., overhead line. Transport electrification in retrospect was marked by some notes that appeared in our columns on the golden jubilee of the first electric tramway system in London. Trams ran between Shepherd's Bush and Acton, Hammersmith and Kew Bridge, and continued until 1931.

With the advent of April the tempo of events quickened considerably. Right at the beginning came the Physical Society's annual exhibition, which was noted as being primarily this year a display of detailed design improvements.

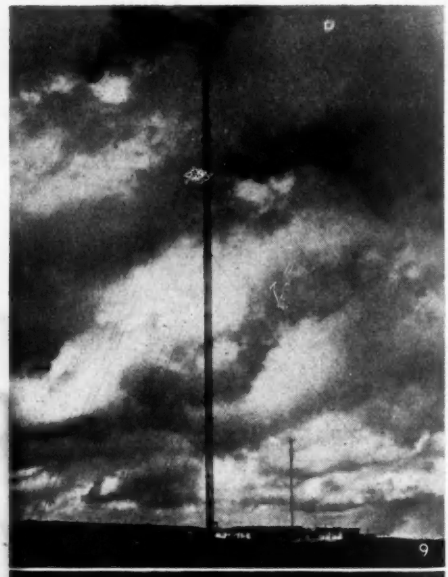
Another annual event falling during this month was the Government's Economic Survey for the year. Coal output was estimated in this as 219-222m tons capital expenditure was not analysed in detail.

Another item from the past to be brought into prominence in this year of memories was the range of historic cables comprising the Hunter-Hazell collection, which was privately exhibited prior to its presentation to the Science Museum. In antithesis was the essential modernity of the plant and equipment on view at the three exhibitions comprising the British Industries Fair, which opened at the end of the month, though with fewer electrical exhibitors than the previous year, we noted.

May was Festival month, and the South Bank exhibition gave plenty to talk about both as regards electrical exhibits themselves and elec-



5. *Poole power station increased in capacity*
6. *Electronic mathematics at Manchester*
7. *West Ham "B" was municipally opened*
8. *G.E.C. manufacturing capacity at Witton was extended by this new alternator shop*



9. *Television services were extended by the opening of Holme Moss*

10. *Fertiliser production is the job of this new factory*

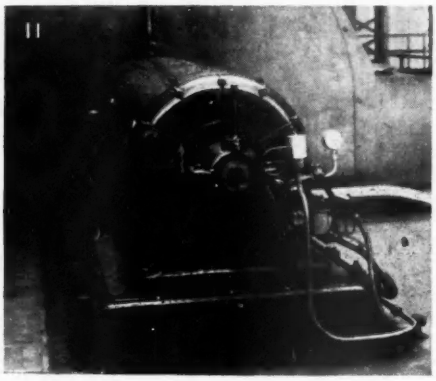
11. *Alternators uncoupled were run as synchronous condensers at Ocker Hill*

trical aids in running the show as a whole. A more permanent memorial to British engineering skill which was officially opened at about the same time was the Immingham fertiliser factory, which incorporated an interesting pass-out turbine electrical generating scheme.

New techniques were explored by those attending an F.B.I. conference on the industrial applications of radio-active isotopes, while another conference which took place shortly afterwards was the annual E.D.A. sales conference, this being overshadowed by warnings of the effect capital restrictions were having on the industry's expansion.

Conferences were well to the fore in June, as always; the B.E.P.C. met at Brighton, the E.C.A at Harrogate, and the B.S.I. marked its golden jubilee with one in London. Another gathering of note was the Joint Engineering Conference organised by the engineering professional institutions to mark the Festival of Britain. Naturally, these happenings filled many pages of the E.T. but there was space as well for the attractively sited Poole power station, which we described after six months of operation.

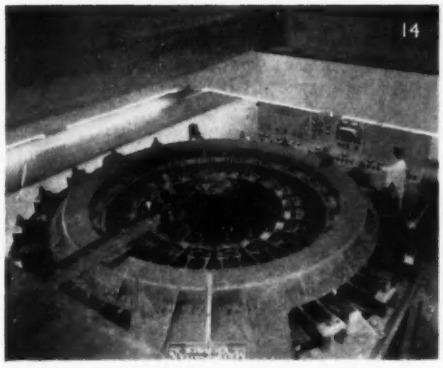
Another power station figured prominently in our pages in July, this being West Ham B, officially opened by the Mayor of its home borough. A smaller, but no less complicated, unit of electrical power described during the month was the electronic digital computor built by Ferranti Ltd. for Manchester University. For top place in size came the Abbey steel works at Port Talbot, the 550-acre site of which houses plant with an estimated peak load of 100 MW. And, to round off a month of inaugurations, there was the official opening, by the Duchess of Marlborough, of the Pimlico district heating scheme, which works in conjunction with Battersea power station.



Factories were still to the fore in our August issues, for we described in some detail the latest design of cement plant and its full use of electricity, taking B.P.C.M.'s Shoreham works as an example. Conferences were in the news, too, for the British Association's annual gathering was honoured by the presidency of the Duke of Edinburgh. There was a warning of the winter to come, however, in a very pessimistic report on power shortages and load shedding which appeared from the Ministry of Labour's Joint Consultative Council. From a warmer climate came information on a five-year plan for India, which included arrangements for an additional 1,100 MW of generating capacity. To close the month, there was the biennial Engineering, Marine and Welding exhibition once more absorbing the full resources of Olympia, though there were fewer exhibitors than in 1949.

September found Mr. Wallace of the E.P.E.A. warning the T.U.C. of the results of capital restrictions on the supply industry. At about the same time, in Brighton, Mr. H. Pryce-Jones was opening the A.P.L.E. conference, which was distinguished by an outdoor display strung out along well-known Madeira Drive. A large scale industrial project attracting much attention during the month was the new Fawley Refinery, opened by Mr. Atlee.

From October we may safely assume that our readers' memory is fairly clear, and hardly a reminder of the kaleidoscope of news and opinion that has figured in our pages is necessary. Holme Moss, the B.E.A. report, an extended G.E.C. works and the issue of abridged wiring rules, and the biggest walking drag line in the world—an irresistible title—all belong to this period, which provide a crowded end to what has been a very full year for the industry in nearly all its sectors.



12. *A British "biggest in the World"—an electrically powered walking drag line excavator*

13. *Hydro-electric schemes advanced in Scotland: This is the dam for Glen Tarsan*

14. *Last and latest—the synchrotron at Glasgow University to be used for nuclear physics investigation*

Notes on Wiring
by MEGOHM

Where Do We Go From Here?

Current Problems of the Contractor

REVIEWING the problems that have arisen during the past 12 months, foremost has been the scarcity of materials which has made life difficult for most contractors' engineers. Much time has been spent chasing and looking for materials which a few years ago could be had for the asking, and also investigating the possibilities of using alternative materials. Travellers' mission in life today appears to be to explain the difficulties their works are experiencing in obtaining raw materials and in general they are unable to give their customers satisfactory advice on the question of delivery.

Steel

The steel position, which I reviewed early in the year, is indeed critical. The position today is grave since rolling mills and stockists will not accept orders, and I am advised that if one wants steel and is not prepared to pay over double the current market prices, the only action left is to keep in daily contact with stockists. This is a pretty dismal picture and, of course, involves expense in labour and telephone calls, etc. for the contractors. I am told steel can be had through advertisements appearing in the evening newspapers under telephone and box numbers at prices ranging between £60-70 per ton. It seems to me that this is a matter that should be investigated by the Ministry of Supply to ascertain the source of supply and trading methods that enable these people to advertise steel for urgent and important jobs and charge something well over double the market price.

I understand the allocation of steel to the British Electricity Authority has been seriously cut and whilst their P.I.T. Section tries to help contractors to obtain iron and steel their efforts have not always been successful. The commissioning dates of plant in consequence are being extended and the pace of constructional work slowed down with proportionate increased costs for supervision and planning work and operative labour forces are therefore small in relation to the magnitude of the work to be carried out. Reports coming in indicate contracts are being run on a hand to mouth basis due to conduit allocations being limited to a few hundred feet a week which, needless to say, is far from efficient or economic.

Cable manufacturers are now advocating that armouring should be omitted where possible, or alternatively that their customers should accept cables armoured with the higher priced imported steel wire armouring from the Continent. The demand for steel is rising and there does not appear to be an easy solution to the problem; maybe, if we can balance our budget, America will be more favourably disposed to send us steel in the New Year. Copper supplies are also limited and cable makers appear to be rationing their customers. Delivery for p.i.l.c.s.w.a. cables is again approaching 9-12 months from the date of order, with the provision that this is subject to the necessary raw materials being available.

Ratings and Earthing

Bread-and-butter supplies are also difficult to obtain and there is now real need to conserve our stocks and resources by the adoption of simplified distribution and wiring schemes and where convenient and safe, to use insulated wiring systems without metallic protective coverings. I cannot see why the current ratings for cables should not again be relaxed by the I.E.E. to the past war-time standards and so materially help the conservation of copper. Another point worth reviewing is the erection of heavy copper earth tapes and the bonding of individual items of equipment mounted on earthed steel switch frames and the bonding by copper tapes of armoured cable glands to the switchgear cases. I believe part of this work is unnecessary and a waste of valuable material and labour.

Specification clauses stating: (a) The lead sheath and armouring of cables must not be used for earthing, (b) Calling for the use of 660 V grade cables on 250 V circuits, and (c) The use of solid drawn conduit should be deleted for all work where exceptional hazards are not likely to be present. Concluding to my readers is my wish for:—

A Very Good New Year to You All.

Oil Stability

Inhibited and standard transformer types compared at I.E.E.

TRANSFORMER oils claimed the attention of the I.E.E.'s Supply Section at the last of their 1951 meetings. Two papers dealing with this subject were presented, the first of them bearing the title "Inhibited Transformer Oil." The authors here were Messrs. W. R. STOKER, B.SC. (ENG.), A.M.I.E.E. (Shell Petroleum Co.) and C. N. THOMPSON, B.SC. (Shell Refining and Marketing Co.), and they began their paper with a brief review of the importance of oxidation stability in transformer oil. When oil becomes oxidised, it may form sludge, which interferes with the cooling, and consequently increases the operating temperature, and acids, which are liable to lead to corrosion. Moreover, certain products of oil oxidation react with cellulose insulation and reduce its mechanical strength.

Types and Tests

The exact mechanism of oil oxidation is not fully known, but it is well recognised that such metals as copper and iron act as catalysts which promote the oxidation process; they probably exist as oil-soluble compounds present as a few parts per million of oil. Four main types of anti-oxidants are recognised: catalyst passivators, which form a film on the surface of the catalytic metal; catalyst de-activators, which reduce the activity of the oil-soluble metal catalysts; oxidation inhibitors, which react to terminate the reaction chain which carries forward oxidation; and indirect anti-oxidants which, initially inactive, become anti-oxidants once oxidation has begun. In evaluating the worth of any of these, it is necessary to correlate laboratory tests and service experience so that a difficulty exists whenever a new method is introduced. However, the translation of the results of laboratory tests can be made with less uncertainty when oxidation inhibitors are used than when other types are concerned.

Oxidation of an inhibited transformer oil is characterised by a more or less prolonged period (called the induction period) during which the inhibitor is functioning to suppress oil oxidation. At the end of this time, corresponding to complete depletion of the inhibitor, oxidation occurs at about the same rate as it would have done with no inhibitor present initially. Test procedures which can take account of this characteristic are described at some length in the paper: they work on the principle of determining the time taken for a known volume of oil to absorb a given quantity of oxygen in the presence of a suitable catalyst. While there has not yet been time to check such tests with oxidation in loaded transformers, it is considered possible that the overall stability of inhibited oil may be sufficient to ensure that the oil outlasts the life of even severely rated transformers.

Base Oil

There is difficulty in deciding what grade of transformer oil shall be chosen for inhibitor addition. In general an oil more highly refined than is necessary for optimum oxidation stability will respond best to the addition of an inhibitor. However, if base oil of satisfactory inherent stability is used, the maintenance engineer can rely upon the usual routine tests made at the usual intervals to keep him informed as to oil condition. So far as choosing an inhibitor is concerned, the main requirements are that it shall not affect the physical properties of the oil, shall not be water-soluble, nor be lost from the oil due to temperature changes.

Tests made in a transformer manufacturer's laboratory are described in some detail in the paper, with particular attention to sludging and its effects on operating temperature. When inhibited oil is used to fill a transformer previously operated with uninhibited oil, some deterioration will occur due to the oxidation products already present, but the inhibited oil will still give a substantially longer service.

Inhibited oil is considered as likely to find its widest application in distribution transformers or other apparatus in which the conditions favour oxidation of the oil. Its extra cost may be justified here by the reduction in maintenance made possible by its use.

Oil Stability

The second paper was a general survey of the stability of oil in transformers, presented by Messrs. P. W. L. GOSSLING, B.SC. (W. B. Dick and Co.) and L. H. WELCH, B.SC.(ENG.), M.I.E.E. In it are summarised operating experience with transformer oils from the aspect of sludge formation and the acidity with life. Tests are described which are designed to study

the correlation increasing acidity of oil in service with predictions of performance based upon the Michie sludge test. Uninhibited Class B oils were concerned.

Transformers involved in the tests had oil samples checked for dielectric strength and acidity every year. The oil in each transformer was filtered every third year. Charts were kept of the weekly maximum loading and maximum oil and air temperature, as well as the annual maximum loading and the highest acidity reached. All oil with an acid value exceeding 1 mgm KOH/gm was changed. Examples of the curves resulting from these measurements are given at some length.

During the 11 years over which the tests have so far been carried out, other experiments have been conducted in an endeavour to slow down the rise in acidity. In each case two transformers in parallel have been used, one being left unchanged to provide a reference point. Lifting the transformer lids to ventilate the space above the oil prevented corrosion of the tank and lid surfaces, but had little effect on acidity. The extra dirt entering the transformer made maintenance more difficult and oil filtration became necessary more frequently. Suspending alumina in a container in the oil was another experiment which proved unsuccessful. Similar experiments did, however, establish the value of breathers fitted with some dehydrating device as a help in slowing down acidity development, and since 1946 all new transformers have been fitted with them.

Finally in their paper, the authors summarise the conclusions they have drawn from their tests. Oils in transformers fitted with conservators, they feel, rarely develop undue acidity. Oils in other conditions tend to develop acidity, but the oil specified in BS148: 1951 may be expected to be satisfactory for use in such transformers and under normal operating conditions, is likely to last for the expected life of the transformer. The low rate of rise of acidity of BS148 oils should make testing necessary only every two or three years.

DISCUSSION

MR. J. W. LEACH spoke of the difficulties of oil troubles in a distribution system. He directed attention to the economics of the problem, and suggested that the problem of oil stability was determined on a basis of transformer temperatures and thus loading. It was probably only because most transformers were usually under-loaded that little trouble with oil had been experienced. The use of better oils made possible saving in capital cost. He suggested that the field for inhibitors was in existing transformers and in transformers for specially heavy duty.

MR. E. A. EVANS said that the first inhibited oils were sold in this country in 1933. He went on to deal with some chemical aspects of the mechanism of oxidation, and on this basis criticised the oxygen absorption test for evaluating oils.

DR. J. S. FORREST (B.E.A. Research Labs.) expressed himself as pleased with the way the data on inhibited oils had been developed over a range of increasing size of test transformers. He suggested that the development of use of inhibitors in the United States has been very recent and 0·3% of d.btc. was used. He was not certain that the U.S. companies had yet gone over wholeheartedly to inhibited oil. B.E.A. research laboratories were experimenting with various inhibitors.

MR. A. W. THOMPSON (Dussek Bros.) covered several of the points mentioned by Dr. Forrest, and went on to suggest that it would be necessary for firms supplying inhibited oils to give some information on the type of inhibitor used, so that the mixing of oils with incompatible inhibitors could be avoided. He criticised the oxygen absorption test as taking no notice of the nature of the end products of oxidation.

MR. E. A. HOWES (B.E.A.) spoke on the value of the oxygen absorption test, and went on to deal with some details of the inhibited oil paper. He mentioned that inhibitors had on occasion been successfully renewed in turbine lubrication oils. He suggested that inhibited oils should only be a few pence more costly than uninhibited oils.

MR. V. BISKE (Lobitos Oilfields) mentioned the possibility of using aromatic solvent extracts for the cleaning out of transformers, as these should have an effective solvent effect on sludge, and thus be an improvement on washing out with warm transformer oil. Its general physical characteristics appeared satisfactory. He expressed the views that there were still possibilities of improvement in refinery techniques for producing transformer oils.

MR. J. M. WARD (B.E.A.) described tests on inhibited oils which are being undertaken in the B.E.A. Research Laboratories, where some seven inhibitors are being tried out.

MR. W. J. RENWICK (G.E.C.) spoke of problems associated with varnish in transformers and the danger of bare copper in windings encouraging high acidity.

DR. T. SALOMON (Strasbourg University) spoke of the long interest in France in transformer oil tests, and agreed largely with the results reported.

MR. G. O. CASTELL said that some varnishes were available which were absolutely neutral when used in oil. He further mentioned that transformers are designed on a basis of cellulose insulation temperature. Too often, however, the present oil would not stand the temperature.

MR. E. TOBIN doubted if a transformer which was operated near capacity would really stand up to difficult service for more than 20 or 25 years, and it was this length of service that transformer oil had to meet. The authors replied briefly, MR. STOKER suggesting that it was very unlikely that any trouble would be experienced with incompatability of inhibitors.

Problems and Practice
IN ENGINEERING

Oil Leakage from Bearings

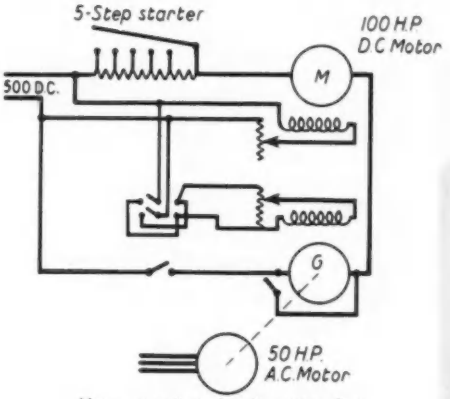
SOME motors and dynamos are very prone to leakage of oil from the bearings along the shaft, no matter how careful one is to avoid over oiling. The leaking oil may accumulate on the windings or commutator and introduce a risk of failure of the insulation. The following method has proved effective in preventing such leakage. A leather washer is cut with the hole rather smaller than the diameter of the motor shaft where it enters the bearing housing and the washer is forced over the shaft. A sheet steel ring drilled for four countersunk screws is used to secure the leather washer in position on the end of the bearing housing which is drilled and tapped accordingly. The leather washer then forms an effective gland and retains the oil in the housing and as it is lubricated by oil from the bearing the washer will last for a considerable period. With oil-lubricated bearings it is necessary that the overflow holes or pipes be kept clear in order that correct indications of the oil level may be obtained. If the overflow is not readily accessible it is an advantage to provide an oil gauge in a convenient position. Oil should always be added when the machine is at rest as the oil round by the rings causes a false level in the gauge or overflow.—*J.W.*

Improvements in Starting

A PROBLEM arose over the supply to an 100 h.p. 500 V d.c. 1,600/2,800 r.p.m. motor. Originally it was started by an automatic 5-step starter. It was decided that the acceleration was too great, by this method, for the rig it had to drive, so a 50 h.p. m.g. set which was available was substituted for the starter. The idea was to run the motor up to speed (1,600 r.p.m.) with this, then parallel up the mains supply, and finally shutting down the m.g. set. This was O.K. for light loads, but it was found impossible to use this arrangement for loads over 25% of full load.

We had no larger m.g. set, so thought was given to other methods of starting and a circuit was devised using the same m.g. set and proved quite satisfactory, giving a gradual increase in speed from zero to 1,600 for all rig loads.

The generator was used to back off the mains voltage. When the output from the generator was reduced to zero we still had an I.R. drop across the generator of some 35 V. This was cancelled out by building up the generator field in the opposite sense until the voltage across the generator was zero, then the armature of the generator was shorted simultaneously opening the field.



Motor starting circuit connections

This circuit is now being revised to make it entirely automatic with just four pushes: start, stop, raise speed, and lower speed.—*W. J. C.*

Some Unusual Sparks

THE writer was called upon to find out why, at intervals, sparks were seen at the commutator end of a 200 kW dynamo which was coupled to a Diesel. The set was behaving perfectly in every way, except for the sparking, which was only of a second's duration, and at odd intervals. Tests on the windings were perfect, but on examining the risers it was found that the varnish was peeling, and on a few of them there were signs of pitting. It was decided that the risers, which were rather flimsy, must have been shorting at odd intervals, causing the sparks seen by the attendant. After cleaning and re-varnishing the risers, a binder was fitted to make a more rigid job, and the sparks have since entirely disappeared.—*F.E.I.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

Steam Generation in U.S.A.

Rapidly Extending Use of the Reheat Cycle

By VERNON WALKER, A.M.I.E.E.

ONE of the outstanding features in turbo-generator practice in the U.S.A. is the marked increase in the number of machines being installed, or on order, for capacities of 100 MW and over. One turbine manufacturer reports that he is building 35 units of this size or larger, including nine of 125 MW.

The largest capacity unit put in service during 1950 is a tandem compound machine of 165 MW running at 1,800 r.p.m. Cross compound units of 3,600/1,800 r.p.m. are being built for 150 MW and tandem compound, triple exhaust 3,600 r.p.m. machines up to 125 MW.

Reheat Predominates

Re superheat accounts for at least a quarter of the large units now being built and in orders for new plant it predominates. The reheat pressures range from 25% to 28% of initial throttle pressure and in an increasing number of cases reheat is brought up to the initial temperature, except that where the latter is 1,050° F it is usual to specify a reheat temperature of 1,000° F. Utilising reheat a 125 MW unit is reported to occupy the same space as a 110 MW non-reheat machine, and will have approximately the same throttle and feed-water flow as the smaller unit. The extra cost of the additional 15,000 kW is only $92 per kW and the heat rate is expected to be reduced by about 4%.

A study of steam conditions shows that some 43% of the capacity being built is for steam pressures in excess of 1,250 lb/sq in. at the throttle, including 12% for pressure over 1,450 lb/sq in.

Although a steam temperature of 950° F is mostly favoured for new machines more than 25% of the units recently installed, or on order, call for 950-1,050° F. A new installation is to have an ultimate throttle temperature of 1,100° F. This clearly indicates the trend towards high steam pressures and temperatures, and the increase in the use of reheat brought about by the present high cost of fuel.

Unit Operation is Favoured

There is a wide use of the single-boiler single-turbine installation, and companies using this arrangement are in general agreement that proved reliability and availability of the modern boiler are such that the higher investment costs of the multiple-boiler installation are not justified. Simplicity of arrangement and operation is another advantage of the "unit" system. Most of the installations do not have any interconnection of the steam and water piping with other units and if interconnection is provided they are normally operated with the valves closed. Reheat installations for practical operation require the single-boiler, single-turbine system with no inter-connection of steam piping; in some cases a tie is provided in the condensate line on the suction of the boiler feed pump which is normally closed. It is general practice to place a valve in the steam pipe between boiler and turbine stop valve, even though there is no inter-connection of steam piping with the unit. This gives additional protection in the event of failure or trouble with the turbine stop valve. It also facilitates hydrostatic tests of boilers.

Companies using more than one boiler per turbine do so largely to obtain greater flexibility and higher availability of turbine capacity. In some cases four boilers for two turbines and in others three boilers for two turbines are

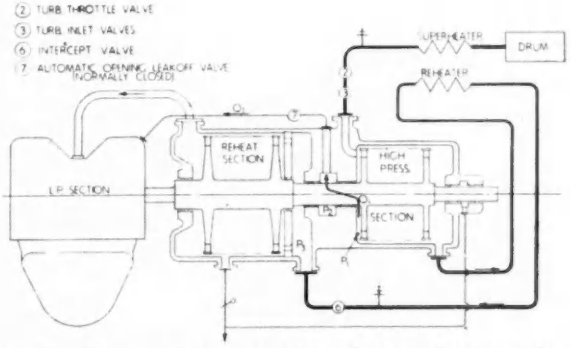


Fig. 1. Diagrammatic arrangement of principal steam valves for re-superheating steam turbine

provided, the boilers in each case being of sufficient size that full capacity can be obtained with one boiler out of service.

Turbine Construction

In the latest designs, considerable attention has been given to simplification of construction so that turbines can be more easily and quickly dismantled. Also for ease of operation the various controls have been very conveniently located and grouped closely together.

For very high steam conditions the double cylinder construction of the turbine casing is adopted in order to obtain an adequate safety factor in the horizontal joint, the walls are also made thinner and stresses due to thermal shock thereby reduced. The inlet control valves are located at the top of the cylinder as with a single casing design, but the valve chests are bolted to the outside cylinder casing and have projecting nipples on the inside. These are inserted in the bores of the corresponding nozzle chests which are made integral with the inner casing. The bolted joints between the steam chests and outer casing are relatively low pressure joints and present no problems in maintaining steam tightness.

Control with Reheat

The control features of reheat turbines have been considerably simplified to protect the reheater and L.P. blading from overheating during starting and at very light load.

Fig. 1 illustrates diagrammatically the arrangement of the steam valves by one manufacturer, the turbine stop valves (2) and turbine inlet speed governor valve (3), the single interceptor valve (6) and dump valve (7). The operating speed governor controls the inlet governor valves in the usual way. A separate pre-emergency speed governor accurately positions the intercept valve, so that for each speed value between 101-105% there is a definite position of opening of the intercept valve. After the intercept valve closes, the small dump valve (7) opens, diverting the major packing leakage, so that the steam in the pre-heater cannot re-enter the L.P. stages. No other valves are necessary for the protection of the unit against over-speeding, or to enable it to successfully drop maximum load instantly with the usual margin below trip speed of the emergency governor.

In order to limit any heating in the exhaust of the 3,600 r.p.m. tandem compound reheat units, which may occur during starting as the unit approaches full speed, and also below 5 % load during normal operation, automatically controlled water sprays are provided in the crossover just ahead of the double flow L.P. turbine. The spray nozzles inject a fixed quantity of condensate sufficient to maintain a temperature of not more than 175° F in the steam leaving the last stage wheels. This is accomplished by a small air-operated water valve which is actuated by air valves attached to the intercept valve and the h.p. turbine control valve in such a way as to turn the spray on whenever the main control valve operating cylinder closes below 5% load position (provided the intercept valve is not closed). Thus upon sudden loss of load, due to operation of the main generator circuit breaker, the water sprays will automatically turn on as soon as the intercept valve re-opens part way and the machine is running at or near 3,600 r.p.m. Further, the spray water will be turned on while the temperature of the steel parts are still low in temperature and before the heating effect actually happens. The spray will automatically shut off when the inlet control valves open beyond their 5 % position. To provide the maximum safety to the reheater tubes following sudden loss of load there are also limit switches on the emergency stop valve and control valve operating cylinder, which send signals to the boiler house when either one or both of these valves reach the closed position. The switch on the turbine operating cylinder will trip out one or more of the coal feeders but leaving one in service to be automatically reduced to the required level by the boiler controls. Upon the emergency stop valve closing due to, say, low vacuum actuating the vacuum trip, a second limit switch will send a signal to the boiler room which will trip out all mill feeders or coal mills throughout.

Such features represent a step forward as compared with earlier reheat controls, eliminating the need of steam by-pass lines from the saturated drum to the reheater inlet.

In a series of quick start tests made after 36 hours shut down on a 110 MW 3,600 r.p.m. 1,250 lb/sq in., 1,000° F tandem compound unit, with special thermocouples installed to measure the temperature of various parts of the turbine casing and valve chests, the turbine was started from turning gear to synchronising in as short a period as 20 minutes. The tests were made in conjunction with loading tests, the unit being loaded from synchronising to full load in as short a period as 10 minutes.

Hydrogen Cooling

Practically all new generators are arranged for hydrogen cooling, and two-thirds operate with hydrogen pressure from 5-15 lb/sq in., the majority of these doing so only for seasonal

or peak load operation. Several companies have units installed or on order which operate at 25 or 30 lb/sq in. either continuously or for peak MVAr loads.

There is an extremely wide variation in hydrogen consumption reported by the companies, both at 0·5 lb/sq in. operation and higher pressures. However consumption at 0·5 lb/sq in. appears to average about 60 to 80 cu ft per day. In the range 0·5-15 lb/sq in. hydrogen consumption appears to be roughly proportional to the absolute pressure, although the variation of consumption with pressure reported varies widely. Above this range consumptions are considerably higher, but that predicted by the preceding relation. In one case measurements at 0·5 lb/sq in. and 12 lb/sq in. showed a variation in hydrogen consumption of 1·0 to 2·2 which is somewhat higher than the average noted above. For rated generator loads, the stator temperature rise at 12 lb/sq in. was 58% of the rise with 0·5 lb/sq in. pressure. For these conditions the rotor temperature rise was 64% of the rise with 0·5 lb/sq in. pressure.

Auxiliary Equipment

Modification of hydrogen seals and the omission of oil treatment apparatus has greatly reduced the hydrogen equipment, and further changes to reduce hazards and simplify operation are now being made. Direct driven main and pilot exciters are furnished with the majority of standard machines. In some installations, however, the direct driven exciters have been replaced by motor-generator exciter sets. The excitation voltage has been raised to 375 volts with some 110 MW machines. By raising the voltage 50% the exciter current is reduced to a third with a resultant shorter commutator with fewer brushes. Likewise one-third less brushes are required on the slip rings of the alternator. Separate turbine driven house generators are not generally used, particularly in new plants. In some cases a house generator is kept spinning at light load on the station auxiliary busbars with automatic relay devices to isolate station transformers in the event of failure of the normal supply. House turbines are also kept spinning when work is in progress, or the normal auxiliary supply cannot be depended upon. In this case the turbines are motored by the generator and cooling steam is supplied to the turbine by means of a by-pass around the relay operated, quick opening throttle valve. In certain cases a house turbine is provided which is not normally running but is designed for quick starting when trouble develops in the normal supply.

GLASS INSULATION

Extending Use of Fibreglass in the Electrical Industry

THE use of glass as an insulant is almost as old as the electrical science. Modern requirements, have, however, made the use of glass in its bulk form in most cases both difficult and inconvenient. The development of Fibreglass, however, has enabled the space and manipulation advantages of tapes, thread and cloths to be exploited to the full, while retaining the inherently good electrical properties of glass itself.

A recently issued booklet available from Fibreglass Ltd., St. Helens, Lancs. gives full details of the wide range of products now available. In the production of constant filament yarn, the fibre-forming plant makes use of a rare-metal alloy crucible carrying 102 or 204 drawing nozzles in the base. To produce an individual filament of 0·00021 in. dia, the nozzles have a bore of approximately 0·04 in. A low-voltage heavy-current system is used to heat the crucible which is fed with glass marbles. The emerging molten glass is at first picked away giving hard-drawn fibre, one filament from each nozzle. These filaments are gathered together at a "V" shaped pad, provided with lubrication and a special textile size, passed downward to a high-speed drawing spindle and wound up at a speed of over 88 ft/sec. Thereafter normal textile procedure is followed in manipulating the thread to the end product.

Staple yarn is produced by a somewhat similar method, but the attenuation to fibre is carried out by air or steam blast. The fibres fall on a drum conveyor in a broad, fine veil which is gathered up in sliver form. This is subsequently twisted or drafted and twisted into a yarn which looks rather like worsted.

The booklet continues by giving details of the physical properties, the types of products now available, and their uses and applications. These latter cover virtually all insulation uses which can be carried out with conventional insulating materials. Particular uses are where space limitations lead to the use of high current densities with consequent high-working temperatures, such as in aircraft equipment and cables. The fireproof qualities of Fibreglass materials are particularly important in this connection. A further advantage is that a conventional machine, rewound with Fibreglass insulation, can be well upgraded.

Preventing Ice Formation

L.T.E. Progress on Third-Rail De-Icing

LONDON TRANSPORT, in the past few years, has given increasing attention to the problem of formation of ice on conductor rails. The accepted method of mitigating this nuisance in the past was to employ sleet locomotives, i.e. electric locomotives specially equipped with ice-crushers, wire brushes and anti-freeze sprays. In 1947 it was first proposed to install conductor rail de-icing baths (from which anti-freeze solution is spread along the rail by train collector shoes passing over sprung rollers) and one of the advantages then expected was that sleet locomotives could be entirely dispensed with. Troubles arose, however, from de-icing fluid splashing on to rolling stock, making the continuous use of baths undesirable, and day-to-day working was adopted according to weather forecasts received from the Meteorological Office every afternoon.

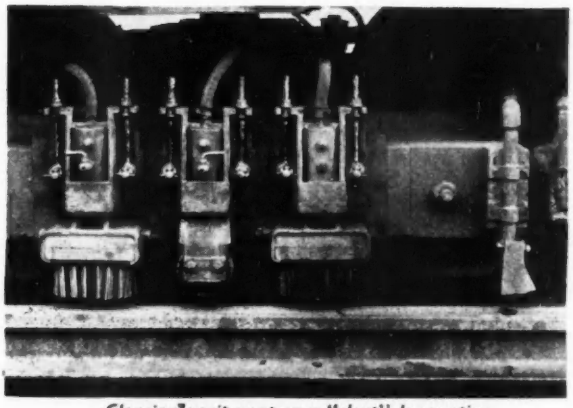
However, under a day-to-day system it is necessary to hold staff available for switching in the baths; furthermore, whenever icing conditions are forecast, it is necessary to switch in at least three "traffic hours" in advance to allow time for an adequate layer of fluid to be spread along the conductor rails. In practice, therefore, it is still necessary to hold sleet locomotives in readiness in case the baths cannot be put into service in sufficient time, although as far as possible their use is restricted to non-traffic hours to avoid interference with normal operations.

De-Icing Baths

One of the first aims, of course, is to avoid using sleet locomotives altogether, but the practicability of using baths alone depends largely on the rate at which an adequate layer of fluid can be built up on the rail. Earlier experiments with baths having non-sprung rollers showed that such baths could provide rapid cover. As a result, all baths on the Bakerloo Line between Finchley Road and Stanmore were similarly modified last winter. On these sections it was unnecessary at any time last winter to call out the sleet locomotives, even during January snows.

Work has continued on the development of thermostatically-controlled baths of which several were installed experimentally on the Epping branch last year. Although these were satisfactory on bench tests as well as in an experimental length of rail at Barons Court, under service conditions it was found that vibration switched them in at temperatures considerably higher than those at which they had been set to operate; a modified design is therefore being developed. There are, moreover, occasions when rail temperatures can fall below freezing point without danger of icing, and for this reason the widespread use of thermostatic control would be uneconomical. So far, no really satisfactory method of switching in automatically has been devised; mechanical switching by means of a lever below the train is impracticable owing to risk of fouling other track equipment, whilst the cost of an electric system would be extremely high.

In addition to the installation at Barons Court of a "meteorological station" comprising instruments for recording air temperatures and humidity and the rail and ground temperatures, two more such "stations" were put into commission last autumn, one near Kingsbury and the other south of Queensbury. Charts from all three have been passed to the Meteorological Office to determine the correlation between rail temperatures and atmospheric and ground conditions.



Clearing equipment on a "sleet" locomotive

overseas news

Tasmania's Results

Electricity rationing in Tasmania resulted in a loss of £90,000 in revenue during the quarter ended June 30 last, the Hydro-Electric Commission estimates. This is stated in the Commission's annual report recently tabled in the House of Assembly. Legislation for rationing of electricity, approved by Parliament in February this year, expires on June 30, 1952, and the Commission is of the opinion that it should be re-enacted in order that the Commission could meet emergencies which might arise. Savings in consumption, combined with better rainfall during May and June this year, permitted restoration of the 1950 consumption levels to bulk consumers from July 1. The total number of units sold (apart from bulk supply) in the year was 350·5 million, an increase of 31·5 million over the previous year. This was mainly due to the connection of 5,792 new consumers, and to the acquisition of 252 consumers in the municipalities of Waratah and Gormanston taken over by the Commission during the year. The Commission is making every effort to expedite completion of the Butler's Gorge, Tungatinah and Trevallyn power stations, which will almost double the present capacity of the system. Plans have also been prepared for two new hydro-electric schemes which will be recommended for the approval of Parliament at the coming session.

Cable Contracts

Tenders valued at more than £250,000 for over 30 miles of underground and pilot cables and for 257 cable jointing units, are recommended for acceptance by the Brisbane City Council Stores Board. The cables and joints, which would be delivered in 1952-53, are needed to meet the demand for power in the Geebung, Northgate, Hendra, Bulimba, Mount Gravatt, Rocklea, Oxley, and Indooroopilly districts. The Stores Board has recommended that Lawrence and Hanson Electrical Co., Ltd., be granted £57,259 worth of the tenders; Henley's Telegraph Works Co., Ltd., £62,142; Australian General Electric Pty., Ltd., £69,054; and Enfield Cables Pty., Ltd., a contract worth £68,157.

Records in Victoria

Power supply in Victoria will deteriorate gravely unless the State Electricity Commission can go on with its £44 million development programme planned for next year. This is the opinion of the Federal State Consultative Committee on Electric Power expressed in the annual report of the Commission, just published. The report says that last year's operations were a record. Capital expenditure on new works—more than £32 million—was reflected in a marked acceleration in the construction programme, which by last June was approaching its full momentum. Planned objectives were within reach until the cut in loan funds was announced at the end of August. Under the revised programme, major additions to the generating system are expected to come into service during 1952 and 1953 at Yallourn, Kiewa, Newport, Richmond and new provincial and regional power stations. Prefabricated "packaged" power stations of 60,000 kW which have been ordered from the United States for Geelong, Ballarat and Mildura, are to be delivered before the end of next year, and are expected to supply power for the winter of 1953. More generating plant than is at present installed in Victoria is on order or being erected. With a total capacity of 826,000 kW, most of the new plant is scheduled to be in service within five years. Units generated last year totalled 2,519 million—an increase of nearly 7%. New consumers numbered 24,677, more than 16,500 of which were in country areas. From this year's revenue of £12,454,498, a net surplus of £1,860 resulted.

South Australia Results

A surplus of £5,813 out of a total revenue of £4,238,279 for the year ended June 30 last was shown in the annual report of the Electricity Trust of South Australia tabled in Parliament recently. The accounts for Leigh Creek coalfield show a deficit of £1,739 for the year after allowing for a grant of £200,000 by the South Australia Government. This compares with a deficit of £47,497 for the previous year after taking into account a grant of £195,000 the report states. Factors contributing to the improvement were higher prices for coal, the utilisation of "fines," previously stockpiled at Leigh Creek, at the Osborne power station, and reduction in costs by the use of the walking dragline. Electrical energy sold increased by 27% on the previous year.

Disaster

The little township of Yarraman, 120 miles from Brisbane, with its 350 homes, was without electricity for some time earlier this month because the small diesel power house was destroyed by fire. The station is owned by Mr. C. Budgen who supplies current under a franchise from the Wide Bay and Burnett Regional Electricity Board. Fortunately a mobile plant has been obtained from Brisbane for emergency duties.

Winnipeg Transport

Public ownership of the Winnipeg Electric Co. street railway system, operated by an inter-municipal transit commission in which Winnipeg is the dominant unit, is advised by Norman D. Wilson of Toronto, the

urban transportation consultant engaged by the Winnipeg Council to report upon the city's transportation problems. The report expresses complete concurrence in Plan "C" of the Hogg report of 1948 as the only feasible basis for reorganisation of the hydro-electric power industry. This proposed complete public ownership of power resources, a central provincial agency with exclusive responsibility for operating and managing all generating plants; and an inter-municipal agency for distributing power and operating the Greater Winnipeg transit system. Mr. Wilson argues that if it is important to the province that transit be divorced from power generation, then it is equally in the interests of the city that basic control of the transit service in the Winnipeg area be retained by the city. He recommends that the province should pass the required legislation to set up an Inter-Municipal Transit Commission, but estimates that $6,175,000 would be needed to provide new trolley-bus and diesel equipment.

Backlog of Meter Testing

Britain is not alone in its meter testing dilemma. In Ontario, the Hydro-Electric Power Commission has been having trouble in its Sudbury district because some meters have not undergone tests. Mr. W. F. Miller, district inspector, gave a recent reminder that the Commission's meters in that area must be brought up to date immediately, for any meter with a seal date of November, 1945, and earlier, which is still in use, is being used illegally. The Commission's local manager has pointed out that his department had not been able to keep pace with inspections as they had about 2,000 to do. The regulation there apparently is that all meters must be tested and re-checked within six years after they have been put into service.

Small H.E. Scheme

Taupo Town Council proposes to proceed with its own hydro-electric scheme. A small plant of 60-70 kW is to be constructed at Huka Falls on the Hatepe Stream, at a cost of about £500 to provide electric light for the population of over 4,000 people. This small unit is only an interim measure until the main plant, of 1,000 kW is obtained from England, probably at the end of 1952.

Plastic Industry Enquiry

In Pakistan recently, the Tariff Commission has been enquiring into the plastic industry, in the course of which the question of prices was taken up. As to electrical accessories, it was found that apart from G.E.C. products, accessories imported from Japan, West Germany and the U.K. were usually cheaper than the local products. The reason given for this by manufacturers was that they incurred higher overhead charges on account of smaller production and had to pay import duty and in some cases sales tax on raw materials. It was decided to investigate the costs of production of such goods as switches, pendant holders, ceiling roses and cutouts manufactured in Karachi. It was pointed out by the industry that during the last year the supply of polystyrene powder, which was imported, was not available in adequate quantities. The position, however, had immensely eased now. The manufacturers asked for the abolition of the import duty of 37½% which was being levied on the imported raw materials and suggested that import of powders from the American account area should be on the O.G.L., as it was from the non-American account area, so that any quantity, whenever and wherever available at competitive prices, could be booked without depending upon import licences which, besides restricting the quantity and value, prevented booking supplies which might become suddenly available. Manufacturers further stated that in some cases they paid sales tax twice—first 10% on the raw material, when they bought it from the importers and again 20% on finished electrical goods.

More Haste Less Speed

In view of some complaints that slow delivery dates are holding up the progress of India's development, it is as well to remember that there is another side to this question. United Kingdom firms who tendered for the very large order for electrical machinery and electrical gear at Nangal lost the major portion of the order to a United States firm mainly because the Punjab engineers insisted on quicker delivery than United Kingdom firms could offer. The U.K. firms, however, pointed out that the deliveries they quoted would phase in correctly with the construction programme at the site and earlier deliveries were not necessary. They have been proved right. The United States firm has delivered most of the machinery to the site, where it has now lain for several months because the construction work there is not ready to receive it ! And it seems likely to remain idle for many months yet.

Japan's Problem

Electricity shortages now affecting Japan's industrial centres have brought forth controversy as to the best method for overcoming the difficulties. The government has much in the press of a big electric power development, but S.C.A.P. power experts say this scheme, estimated to cost at least £100 million, is but a politician's dream. They criticise the scheme on the ground that it involves the setting up of one "octopus-like corporation," and provides for the construction of five dams to form reservoirs which would destroy extensive rice-growing territory. The first objection is based on the fact that the occupying authorities only broke up the country's power monopoly in May last (against the wishes of the latter body, of course). For since May, S.C.A.P. authorities have been "disappointed" at the lack of development by the industry. And now the country is faced with serious interference by industry because of power cuts. Foreign experts say famine is inevitable due to bad government planning, and have suggested that small hydro-electric schemes be developed throughout the country, instead of a large project such as was contemplated on the Tadami River, north-west of Tokyo.

PERSONALITIES

IN THE INDUSTRY

The end of this year brings the retirement from the service of the Corporation of London of **Mr. E. W. Greener,** A.M.I.E.E. He has been with the Corporation for 39 years, during which period he has served under the late Mr. H. R. Mott, M.I.E.E. and Mr. A. Roberts, M.I.E.E., city electrical engineers and inspectors. Prior to joining the corporation he was for five years with the old Westminster Electric Supply Corporation Ltd., serving under the late Mr. Gerald Partridge and Mr. J. W. Jones, after two years spent with the St. Marylebone undertaking. Mr. Greener is planning to continue his interest in the electrical industry by devoting much of his time to designing and advisory practice. His many friends will wish him continued good health.

In the course of his six-months' leave in this country, **Mr. W. G. Scott,** B.SC., M.I.E.E., general manager in Malaya of the Perak River Hydro-Electric Power Co., is now visiting Scotland again and plans to study the hydro-electric developments there. Mr. Scott, who took his engineering degree at St. Andrews, has been with the company for 22 years, for the last two as general manager in Malaya.

Mr. J. H. Fraser, B.SC., A.M.INST.C.E., M.I.R.S.E., signal and telecommunications engineer, York, British Railways, has been appointed chief officer, engineering (signal and telecommunications) at Railway Executive headquarters, London. At York, he has been responsible for carrying out the new signalling installation.

Sir Alexander Roger, K.C.I.E., who is chairman of British Insulated Callender's Cables, Ltd., Automatic Telephone and Electric Co., Ltd., and of the Anglo-Portuguese Telephone Co., sailed last Thursday for an extended tour of South Africa, the Rhodesias and Mozambique. He only recently returned from a visit to Portugal, it will be recalled.

Mr. A. J. James, A.M.I.E.E., M.AMER.I.E.E., has been appointed works manager of the English Electric Co. of Canada, Ltd.

Mr. D. J. Hopley has been appointed managing director of Oldham and Son (India) Ltd., the recently-established associate company of Oldham and Son Ltd. He succeeds **Mr. Edgar Oldham,** who was seconded to the Indian company to set up its initial organisation, and is returning to England to continue his work as chief technical officer, Overseas Control Division of the parent Company. Mr. Hopley has already taken over at the factory at Saidapet, Madras, where motor car batteries are now being produced for the Indian market. Mr. Edgar Oldham is remaining on the Board of the Indian company. Mr. Hopley has been with Oldhams since 1949 as a technical sales officer, after previous experience on electronic-controlled switchgear development work.

Mr. D. J. Hopley

Six new appointments to the Board of E. K. Cole Ltd. are announced. Three executives who are now directors are: **Mr. Frank S. Allen,** M.I.P.E., general works manager of the Radio Division since 1945, and who was largely responsible for the change over from war to peace production of Ekco factories; **Mr. John Corbishley,** A.C.A., who, associated with the firm since 1932, became chief accountant in 1944 and director and secretary of Ekco-Ensign Electric Ltd. in 1947; and **Mr. A. W. Martin,** M.B.E., ASSOC.I.E.E., who has been chief engineer for the past eight years. He joined Ekco as research engineer in 1928; during the war years he was responsible for many radar developments. Mr. Martin will continue to be responsible for the design and development of Ekco products. The three executives who have been appointed executive directors are: **Mr. G. W. Godfrey,** M.I.S.M.A., who started with the firm as sales manager in 1945;

Mr. F. S. Allen

Mr. J. Corbishley

Mr. A. W. Martin

Mr. D. Radford

and became general sales manager of the Radio Division in 1948 (he is the present chairman of the Television Promotion Committee of the B.R.E.M.A.); **Mr. D. Radford,** who, as general manager of the Ekco Plastics Division for the past six years, has been largely concerned in the company's greatly expanded interest in that sphere; and lastly, **Mr. W. M. York,** F.I.A.M.A., M.I.S.M.A., who has been responsible for Ekco publicity since joining the company in 1932.

Previously station chemist at Lancaster generating station, **Mr. H. Gaunt,** M.SC., has been appointed group chemist for No. 1 sub-division of the North Western Division of the B.E.A.

Mr. Hugh Beck, B.SC., A.M.I.Mech.E., M.I.Mar.E. London Office manager of Crossley Brothers Ltd., has been appointed to a seat on the Board of Directors of the Company.

Mr. J. Griffith Hall, director and secretary of the Westinghouse Brake and Signal Co., Ltd. has been appointed to the board of Westinghouse Garrard Ticket Machines Ltd.

A presentation took place at Rugby recently to commemorate the completion of fifty years continuous service by **Mr. R. C. Moss** with the British Thomson-Houston Co., Ltd. Mr. Moss started with the Accounting Dept., but later joined the Secretary's office staff. For many years now he has produced important statistical statements for the Board of Directors. At the gathering he was presented with a television set by Mr. E. S. Little, secretary and comptroller, on behalf of colleagues and friends.

Mr. A. M. Ingram, formerly manager of the Slicer Division of Crypto, Ltd., will, as from January 1, 1952, take up an appointment as manager of the Leeds Branch of Crypto who will continue to control sales and service in the Yorkshire area from 51 St. Paul's Street, Leeds. Mr. Ingram is succeeding **Mr. W. H. Lowth,** the original branch manager, who is now retiring after 20 years' loyal service.

The long business association of **Mr. C. H. Fitter** and **Mr. J. Poulton** as manufacturers of conduit fittings, which commenced back in January, 1919, is to end at the end of this year, we hear. Both members of the firm have been actively associated with the progress and development of the business since that time, and his many friends in the industry will be sorry to learn that Mr. Fitter has decided to retire on December 31. From that date the business will be carried on under the guidance of Mr. J. Poulton.

Mr. Merton F. Frankenburg is resigning the position of chairman of the Greengate and Irwell Rubber Co., Ltd., as from January 1, but will maintain his connection with the company in an advisory capacity. He will be succeeded by **Mr. W. G. Morris,** the present deputy chairman, and **Mr. Jasper Frankenburg** will be deputy chairman.

Mr. K. A. Thomson has been appointed a director of A. H. Hunt, Ltd.

Bruce Peebles and Co. Ltd., announce the appointment as from January 1, 1952, of **Mr. P. Butler,** B.SC., M.I.E.E., and **Mr. W. B. Laing,** M.I.E.E., Assoc. Heriot-Watt College, as joint general managers of the company, with responsibility to the managing director. Mr. Butler and Mr. Laing have had long association with the company and are well known as departmental managers in which capacity they—in their respective spheres—have been intimately connected with the great expansion in the company's transformer, rectifier and rotating plant business.

Babcock and Wilcox, Ltd., announce that **Mr. H. B. Clark** is retiring at his own request from the position of secretary as from December 31, but he will retain his directorship of a number of B. and W. subsidiaries. Mr. Clark joined the Vickers Boiler Co., Ltd. (later acquired by Babcock and Wilcox) in 1919. **Mr. L. W. Cole,** B.COM., who has been appointed secretary to succeed Mr. Clark, joined the accounting department in 1924, and has been assistant secretary since 1943.

OBITUARY

The death occurred on December 17 of **Mr. C. R. Palmer,** aged 66, who was for many years managing director of the International General Electric Co., Ltd., in India, where he had spent the major part of his career, during the course of which he made innumerable friends in that region. He had earlier served with the British Thomson-Houston Co., and in New Zealand. Resigning at the end of 1946, he retired to South Africa, and until lately resided in Claremount, Cape Province.

Dr. J. D. Byrd, principal medical adviser to the North Western Division of the B.E.A. and the North Western Electricity Board, died on December 14, aged 58.

Mr. F. W. Field, former illuminations engineer to the Blackpool Corporation, died on December 17, aged 71. He started with the Corporation electricity undertaking, dealing principally with tramway supplies, and became resident engineer for the Transport Department. When Blackpool Corporation decided to centralise engineering services for the town, Mr. Field carried through that reorganisation, and he later took charge of the reconstruction and re-electrification of the Fleetwood tramline. But it was in the field of illuminations that his creative flair was given full rein and he played a prominent part in the development of Blackpool's lights from the original small display in front of the town hall to the seven miles of brilliance for which the town is now famous. Mr. Field retired in 1946 after 47 years with the corporation, but returned in 1949 to organise the first post-war illuminations.

World Power Resources

Lord Verulam Gives a General Review

A BROAD survey of world power resources was given by Lord Verulam at a meeting of the Royal Geographical Society held last week. Introducing the subject, he emphasised that the progress of modern industrial civilisation was dependent on power. In Europe it was generally accepted that more power per man was the royal road to economic solvency. Progress therefore was not possible unless power was immediately available. In America, the power consumption was about 7,000 kWh per man per year, as compared with 2,300 kWh per man in this country.

The problem of transmission was one that continually restricted the exploitation of electric power. Nevertheless, considerable potentialities were available in Norway over and above the foreseeable demand. These existed mostly on the east and south-east coasts about 360 miles from England, and he foresaw the possibility of transmitting this power within the next twenty years or so. If this was done successfully, it would also become practicable to connect up with Iceland if economics permitted.

Harspranget

As an example of the development of hydro-power, he referred to Harspranget, the large underground power station being completed just north of the Arctic Circle. This was a monument to Swedish skill, both in the solving of the technical problems associated with the design and building of the power station and in the transmission system. An example of the ingenuity of the engineers during construction was the construction of a gigantic siphon to take water under the the dam which was then built in comparative dryness. The main transmission system was designed to operate at 380 kV and carried power over a distance of 193 miles. This was being carried out using alternating current, but for these distances, provided equipment could be built, d.c. was a more electrically satisfactory proposition. Work was therefore being carried out by Swedish engineers on h.v., d.c. transmission, which would also be satisfactory for undersea cable transmission.

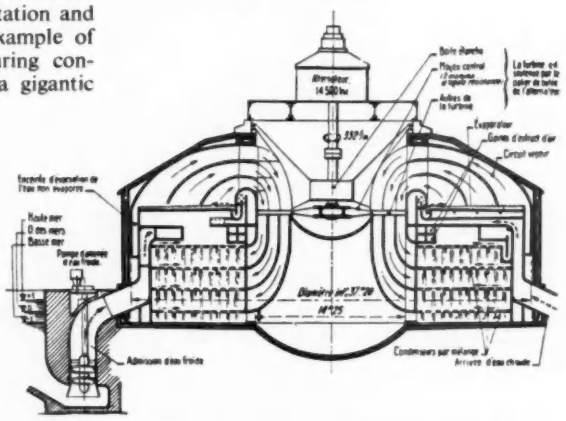
In France much work was being done on the exploitation of the hydro-power of the Rhone and its tributary the Isére. Many plants had been planned both between Lyons and Lake Geneva, and between Lyons and the sea. Of these Genessiat was well advanced, and when finally completed would be the largest in Europe excepting Russia.

Africa was a continent which for its size possessed comparatively few hydro-resources, and these were frequently located in places extremely difficult of access, and far from the centres of utilisation. Here again was a situation where h.v., d.c. transmission would open up immense possibilities. The Belgium Congo might then become the power-house of Africa.

Other Power Sources

Apart from coal and water power, there were several other power sources which could be exploited to a greater or lesser degree. One of these, wind power, was under active investigation, and a wind driven machine was being built for the B.E.A. and would be erected on a suitable site in Wales in the near future.

Tidal power had frequently been proposed, and again a scheme had been developed tentatively for this purpose, using the fairly high tides on the west coast of France at Avranches. The plant was designed to have a storage basin covering about 140,000 acres.



This section shows the proposed turbo-alternator system to be installed at Abidjan, using the temperature difference between the top and bottom of the sea to generate steam under vacuum

A further French experiment, being actively pursued, was to utilise the temperature difference between the top and bottom of the sea, and a project was being developed for Abidjan where the temperature difference between the top and bottom of the sea—a difference of 13,000 ft, was 36° F. Experiments were being carried out on the design of the cold water inlet pipe—a major problem.

Geothermic power was available, although in many cases difficult to exploit. Larderello, in Italy, used steam from the borax wells to produce power and had an installed capacity of 104 MW with a projected capacity of 150 MW.

In New Zealand, large quantities of geothermic heat were available and trial borings were being undertaken in a search for dry steam. Bores down to 500 ft had produced considerable quantities of steam with, however, a great degree of wetness.

The question of nuclear power could not be overlooked. It might ultimately be possible to produce electrical power directly from the atom without the thermal intermediary stages, but at the moment, the thermal system was under development. Here a great saving would be in the cost of transport of the fuel.

Following Lord Verulam's address, telephonic communication was established between two engineers in the control room of Harspranget and the conversation relayed to the audience by loud-speaker. They described some of the more important sections of the plant, and the conditions of operation.

Nigeria

As an example of the difficulties associated with the power development of comparatively virgin territory, Mr. J. Houston Angus, chairman of the Nigerian Electricity Corporation, described some of his personal experiences in Northern Germany, Bolivia and Nigeria, and contrasting the power balances and conditions he encountered in those countries. His main interest at the moment, was of course, Nigeria, and he described the general scheme for the electrical development of the area. He pointed out that large sections of the country were virtually unexplored, that practically no data existed as to water-flow, rainfall, areas of watersheds and other important factors. All this fundamental work would have to be done by the power engineers. As an example of the ignorance existing about hydro-power, he quoted a persistent native statement that in the hinterland there was a fall comparable in size with the Victoria Falls.

Finally, a film was shown illustrating the laying of a power cable between Sweden and Denmark. Mr. Chaplin, of Enfield Cables, gave a commentary on this.

Electricity in the Countryside

PROBLEMS connected with the development of electric generation, transmission and distribution are discussed at some length in the second annual report of the National Parks Commission which appeared shortly before Christmas. It is noted that its general problem of electrical distribution in the National Park areas was discussed with representatives of the B.E.A. and the area boards. Much as the Commission would like to see the extensive use of underground cables in these areas, it recognises that this would involve a disproportionately high outlay of capital. The demand of those who live in the Park areas for electricity makes it impossible to rule out uncompromisingly the use of overhead lines.

The report suggests that "much can be done to avoid disfigurement by the careful siting of pylons and poles, and in this respect notes the valuable co-operation of the B.E.A. in securing the less unsuitable of the alternative sitings available. It is further noticed, with appreciation, that the B.E.A. and the area boards have been giving special attention to this question.

Financial

In special circumstances, such as where there are areas of exceptional beauty, it is contended that it is essential for the lines to be underground. The fundamental problem in such cases is stated as being, who shall bear the extra cost of the underground cable? The Commission feels very strongly that where the additional expenditure is due to the implementation of national policy (e.g., the National Parks Act), it should be borne nationally. The matter is noted as being under discussion with the B.E.A.

A large section of the report deals with proposed hydro-electric schemes in North Wales. At least two informal meetings were held with the Minister of Fuel to discuss these matters, and he emphasised that to carry out the schemes, the B.E.A. would need to promote a private bill. For this, in turn, it required his consent. An undertaking was given that before he gave such permission, the Minister would consult with the (then) Minister of Local Government and Planning.

Appendices to the report give some of the letters and memoranda that have passed between the Commission and the Minister of Fuel and Power on the subject of electricity, and also include the full observations of the Commission on the North Wales hydro proposals. The report is published by H.M. Stationery Office, price 2s.

The BUYER'S *Column*

Thermal Storage Heaters in the Home

AN unusual thermal storage heater using "copestone" as the storage medium has been developed by LUMITE LTD., Blackhall Parade, Dublin.

These Lumite "Airflo" copestone heaters are designed so that they can be used as (a) static storage heaters, (b) convector-type storage heaters or (c) straight convector heaters.

The heater comprises a well-designed sheet steel exterior container insulated with non-deteriorating glass wool slabs. Within this insulated part are two air ducts open to the air at the bottom and closed at the top by means of a multi-position air control shutter. These air ducts are provided with suitable fins between which and surrounding the ducts a quantity of "copestone", a specially-treated soapstone, has been packed.

The heating elements are normal type rod elements disposed centrally and easily removable. When the heater is fully charged the heat output is gradually dissipated over a 15-hour discharge period if the shutter is closed or 11-hour if opened.

Model A15 rated 1 [illegible]W is priced £15 15s., and measures 21 in. x 15 in. x 28 in. Models A30 and A45 (3 kW and 4·5 kW) measure 37 in. x 15 in. x 30 in. (the A40 is 5½ in. deeper) and are priced £26 and £38 10s. respectively.

Other types of copestone heaters not incorporating the "Airflo" heat boost characteristics are available at £11 15s. and 12 gns. They are finished with bronze cream and crackle brown panels or crackle brown trim with cream panels. All prices are subject to a discount of 40% F.O.B. Dublin.

Henley Heater Wire

FOR internal connections of cookers, hotplates, radiators, and other electrical heating apparatus, it is necessary to have wiring which can be relied upon to stand up to the high temperatures encountered, without fear of deterioration. For this purpose Henley Heater Wire is admirable.

It consists of a plain copper conductor (strand or solid wire) covered with asbestos fibres, providing a uniform and homogeneous layer which is impregnated with a special moisture-resisting compound, and then compressed to form a compact wall of insulation. The wire is then finished with asbestos braid impregnated with a flame-resisting compound.

Its construction is such that it can be bent to the angles necessary for neat wiring without any detrimental effect, and it is suitable for operating at pressures up to 660 V with temperatures up to 400° F.

This type of wire is normally supplied in coils of 100 yards and is manufactured by W. T. HENLEYS TELEGRAPH WORKS CO., LTD., 51 Hatton Garden, E.C.1, with white finish as the standard. Other colours can, however, be supplied if required.

Chalfont Bed Sheets

WARMTH where it is wanted is the idea behind the introduction of the Chalfont electric bedsheet introduced by CHALFONT ELECTRICAL PRODUCTS, LTD., Tyrell St., Leicester.

Believing that extra warmth is needed above the sleeping soul and not underneath, as in many bed warmers, the firm has designed a lightweight flexible, yet waterproof and fairly fireproof sheet with three-heat switch control.

The material used in the covering is woven from synthetic fibres and is available in pastel colour as well as white. The heating sheets with thermostatic control and three-heat switches make it possible to heat up the bed and then keep a gentle warmth at an economical rate of 20 hours continuous heat for one unit of electricity.

Available in single and double-bed sizes with individual control each side on the double size guaranteed for 12 months and supplied in an attractive transparent container the bedsheets are priced as follows:—

	List Price	Purchase Tax	Total
Popular size—60 in. x 33 in.:—			
Single-heat	£6 1 8	£1 10 5	£7 12 1
Three speed	£6 15 0	£1 13 9	£8 8 9
Double-bed size—60 in. x 51 in.:—			
Single-heat	£10 5 0	£2 11 3	£12 16 3
Three speed	£11 16 0	£2 19 0	£14 15 0

Adjustable warmth from a flexible waterproof safe sheet is a feature of the Chalfont Bedsheet

Safety Guard for Fires

ATTENTION has been focused in recent years to the number of fatal accidents occurring through the night-wear and dresses of children and adults catching fire through inadvertant contact with the elements of portable fires.

Many manufacturers have now marketed models with a special safety caging protecting the elements, but there are still enormous numbers in use which are a potent source of danger.

An introduction by the KLEERUN TRAP CO., LTD., Lane End, High Wycombe, Bucks., will be welcomed by parents. It is the "Ann-D" safety-guard Model A for fitting to reflector type fires up to 15 in. long and 8 to 10 in. between top and bottom of reflector.

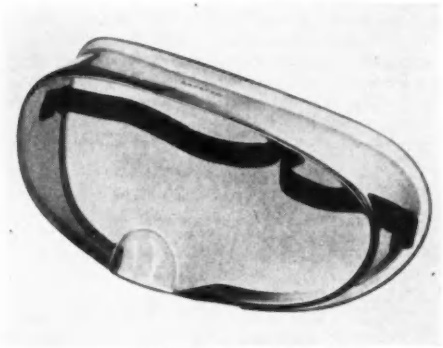
Awarded the Seal of Guarantee Certificate of the Good Housekeeping Institute the "Ann-D" guard costs only 10s. 6d., plus 1s. postage and packing.

Made of welded wire mesh and supplied in matt silver finish the guard affords adequate protection from the risk of accidents from fires.

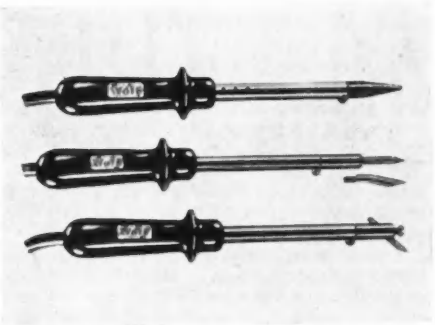
Development in Safety Goggles

INDUSTRIAL eye-shields which give complete protection without discomfort to the bridge of the nose or the ears have long been sought after. J. and S. NEWMAN LTD., 100 Hampstead Road, N.W.1., introduce an eye-shield which answers all the problems connected with this important side of safety and welfare in factories, and other situations where the eyes are under stress or danger.

"Safespex" offer completely unsplinterable and ventilated goggles, toned to individual industrial and institutional requirements, e.g., green for welding, red for X-ray work, grey/blue for sun glare and clear for general use, all giving complety unrestricted field of vision. The wearer of these safety goggles, if wearing spectacles, has no difficulty in placing "Safespex" over his present eye-wear. "Safespex" rest only on the cheek bones and the forehead, thus avoiding any discomfort to the nose or ears, an elastic band holding these lightweight goggles easily in place.



"Safespex" indeed!



The new soldering irons are straight handled

New Wolf Soldering Irons

NEW additions to the range of electric soldering irons supplied by WOLF ELECTRIC TOOLS LTD., Hanger Lane, Ealing, W.5., have recently been announced. All are of the straight handle type. They comprise three models—Types 22, 32 and 42 which, whilst retaining all the general features of the original range, have been designed to meet the demand for conventional straight handle types.

In keeping with all other models, the heating elements are designed to concentrate heat on the working point, providing a rapid and constant heat. They are sturdily built to withstand heavy usage and are fitted with hard wooden handles with a heat-deflecting skirt.

Problems Transferred

THE speciality of TRAPINEX LTD., 355 High Road, Wood Green, N.22, has for long been the marking and advertising of quality goods. Indeed, many of our readers will be familiar with the company's "Hall-Mark" transfers.

A new venture of the firm in advertising is this time concerned with the publicity of their own products. They have now issued Number 1 of a magazine "Trapinex Hall Marking" which seeks, quite successfully, to illustrate the many types and uses of their transfers in industry.

There are innumerable uses of these "Hall Marks," included are: trade marks, name plates, operating instruction, safety notices, patent and serial numbering, colour indicators, machine numbering, dials and gauge marks, specification plates, wiring diagrams and direction arrows. All these can be effected on any surface, metal, wood, plastic, glass, whether rough, smooth, heated or not!

They are to be found on the sides of vans and vehicles, on petrol drums, paint cans, cameras, toys, home permboxes, fire extinguishers; in fact, everywhere where a name is required.

Prominent users in the electrical industries are: G.E.C., Hoover's, English Electric, Murphy Radio, Regentone, Brimar valves and many others.

No matter what application, what surface, colour scheme or language it appears that Trapinex Hall Marks are a very sound idea.

THE WEEK

COMMERCE *in news* COMMERCE

B.E.P.C. Cut to Three Days

AS foreshadowed last week a decision has been reached by the Council of the British Electric Power convention to shorten the period of next year's convention. It was resolved that in view of the necessity for economy at the present time the period of the convention to be held at Bournemouth in 1952 will be curtailed. The convention will now open on the morning of Monday, June 16, and conclude at mid-day on Wednesday, June 18, and the programme which has already been agreed is being adapted accordingly. In the above circumstances the official electrical exhibition will not be held.

Canadian Electrical Show

NEXT year's Eastern Canada All Electric Show is to take place in the exhibition hall of the new Palais du Commerce at Montreal from March 10 to 14. This exhibition hall should be ready to house its first show by January. The product groups which may be shown, have been divided into seven parts. These are, broadly, as follows: Cables, conduits, insulators and lamps; distribution equipment and motors; tools; domestic appliances; lighting fixtures, floor and table lamps; service pumps; and photographic equipment. There are 227 booths available to exhibitors and U.K. manufacturers should advise their agents to apply to Eastern Canada Exhibitions Inc., Le Palais du Commerce Building, Montreal.

The First Half-Century

The Institution met last Thursday night that everybody who had anything to say about the demand indicator and the Wright tariff might say it. The evening, however, proved too short for the business: many were closured out and their works of wisdom will have to be sought in the Journal of the Institution. There was a small amount of preliminary business—Major Cardew had to announce the presentation by Major-General Webber of a large photograph of Queen Victoria which was on view at the table. The original is a portrait by Angeli, of which fifty photographic copies were made for Her Majesty in the main for presentation to relations and friends. Major Cardew said that the King had given special permission to Major-General Webber to have a copy for presentation to the Institution.—*From our issue of December* 26, 1901.

Belfast Dispute Settled ?

THE dispute which has been going on since the summer concerning the position of deputy electrical engineer resolved, a short time ago, into a tug-of-war between Belfast's Electricity Committee and the General Purposes Committee over the salary to be given to the successor of Mr. M'Candless who formerly occupied the post. Mr. M'Candless received some £1,500 p.a., and the new salary proposed was £1,800-£2,200. The dispute was made more complicated by a recommendation from the Electricity Committee for the retention of Mr. M'Candless at the increased salary. Recently the opinion of the B.E.A. was sought in an effort to settle the matter.

Latest reports from Belfast show that the electricity Committee has accepted a recommendation by the G.P. Committee that the appointment should carry a salary not in excess of those of deputies of other departments—£1,500 a year. It is understood that Alderman W. H. Cooper, chairman of the Electricity Committee is against this decision. When approved by the City Council in January, the post will be advertised.

Radio Sales Down—TV Up

FIGURES for the sale of radio and television sets during October were published by the R.T.R.A. just before Christmas. While the former showed a decline, those for television sets showed quite a substantial increase, being well above last year's comparative total and the highest this year since April. The average number of sets sold per shop was:—

	1951	1950
RADIO		
September	10.17	15.05
October	9.48	15.22
TELEVISION		
September	8.82	11.77
October	12.41	10.75

Assistance for Rural Areas

AT a recent meeting of the S.W. Consultative Council it was resolved to oppose any further increase in the unit cost of electricity to any class of consumer, pending a decision by the B.E.A. on a progressive assistance policy to the Area and a resumption of general development activities. The chairman said that it was absolutely essential that the B.E.A. should formulate a policy of national assistance to help rural electrification which was not in itself economic. Moving the resolution, Mr. J. T. Beresford said a national subvention on some basis would eventually be

essential if the cost of a unit was not to get completely out of hand. The area was dependent on some such agreement. The main argument against, it was stated, was that it was unfair to expect other Areas already paying more, to contribute to expenditure in rural districts. Having supported the new S.W. tariff rates, another member said, the Council would go no further until the subvention question was at least considered. Following the discussion, Mr. S. F. Steward, chairman of the Board, hinted that increased charges might be necessary in view of rising prices.

French Technical Films

THROUGH the courtesy of the Electricité de France a number of French films were shown in London last week under the auspices of Enfield Cables Ltd. These dealt with some of the major French electrification projects, including the building of dams for hydro-electric schemes and the construction of 220 kV lines. A film of the laying of Enfield compression cable in France was also shown.

Profit for Rate Relief

ALTHOUGH the days are past when town councils wrangled over the disposal of surplus from operating their electricity undertakings, the same sort of arguments are now cropping up where towns have made a profit from their illuminations schemes. The latest of these occurred at Leamington, when a recommendation of the General Purposes Committee that the profits of £9,500 on the recent illuminations should be apportioned between rate relief and improvements for next year's programme, came before the council. Although chairman of the G.P. Committee, the Mayor, Alderman O. R. Davidson, disassociated himself with that committee's recommendations, himself advocating that all the profit should be spent in a £30,000 scheme for next year. But the council agreed that the illuminations should be developed gradually and the committee's recommendations were adopted.

Heavy Contrast Permitted

ALTHOUGH we are not especially interested in the difficulties involved in exhibiting some thousands of cloth patterns, the lighting problem which that display produces does present some interest. The problem is, of course, to provide shadow-free illumination of a uniform intensity throughout, and was encountered recently at the new showrooms of Dormeuil Freres, a West End woollen merchant. This installation was designed by Siemens Electric Lamps and Supplies Ltd., and carried out by Druce and Co. Ltd. A single row of 5 ft 80 W fluorescent lamps was fitted behind a shallow canopy, and for the stage at one end there are colour-matching blue and warm white fluorescent lamps above an ornamental metal grille. General illumination of the showroom has been provided by indirect lighting—5 ft 80W fluorescent lamps, overlapped, being employed. The arrangement automatically gives a high degree of contrast, which, though most effective to emphasise the displays, might not be considered conducive to the comfort of visitors. The latitude is, however, permissible in this case as the period of vision is unlikely to be lengthy.

Lighting installation at the new showroom of Dormeuil Freres showing the indirect general lighting from cornices, the local lighting for examples of patterns in the alcove, and further local lighting for the stage

More London Trams to be Scrapped

MORE of London's trams will make their last journey on the night of January 5 when the sixth stage, and most extensive so far, of the conversion from tram to bus operation, takes effect. Six former tram routes will be replaced in this stage, involving the withdrawal of 109 vehicles, and these will give way to 105 buses. This brings the total number of trams taken out of service to 523.

Three Courses in London

WE have received details of some courses to be held at Sir John Cass College, London E.C.3, next year. A laboratory course on Solid Fuel Analysis, to be given by Mr. S. Wald, will begin on January 7, and continue on successive Mondays, one on "Radiation Detectors and Counters," by Messrs. J. Sharpe, W. R. Loosemore and R. B. Owen, will take place on January 15 and following Tuesdays, and a third on "Patents and Industrial Design Protection," by Mr. Eric Walker, will be held on January 24 and successive Thursdays. Applications in each case should be sent to the Principal, Jewry Street, Aldgate, E.C.3.

Roadway and localised lighting with mercury and tungsten lamps respectively, in the new installation at Singapore docks, just completed

Course on Electronic Instruments

THE Department of Electrical Engineering at S.E. London Technical College opens a new course of lectures entitled "Electronic Instruments and Applications," next month. The course has been divided into three. Part one, on "Instruments," begins on January 8 and continues until February 26. Parts two and three will be on "Electronic Computing" and "Cathode-ray Oscilloscopes," to be held on successive Tuesdays between March 4 and April 8, and April 22 and May 13 respectively. The lecturers will be Messrs. O. Davie, H. J. Heath, and R. C. Orford. Fees for parts one and three are £1 5s., and part two only, 12s. 6d., and applications should be made to C. W. Robson, Departmental Head, at the College, Lewisham Way, S.E.4.

Singapore Docks Re-lit

LITTLE of the lighting installation at Singapore docks was left intact at the end of the Japanese occupation and the reconstruction work which started immediately after the war has just been completed. All the equipment was supplied through the Singapore branch of G.E.C., which worked in collaboration with the City's Harbour Board. Main lighting is by 400 W mercury lamps in lanterns with bowl diffractors. New brackets have been added to existing lattice steel standards. On the wharf those standards are situated at the head of each godown, but several new godowns have been added and for these pipe brackets attached to the godown eaves have been provided. Only additions to the mercury lighting comes from tungsten lamps in 18 in. R.L.M. reflectors mounted under the eaves to supplement the roadway illumination.

E.I.B.A. Dance raises £268

FOLLOWING the annual dance and carnival of E.I.B.A.'s Birmingham branch, on October 12, over £268 has been handed over to the Association's funds. This, incidentally, was an increase on the amount raised last year. We note also that this branch's next function will be a dance at the T.I. Social Club, Oldbury, on February 15. Details of this may be obtained from the hon. secretary, Mr. L. Wall, c/o Electrical Components Ltd., 102 Snow Hill, Birmingham 4.

Floodlights at Newmarket

MANY readers will probably have read of the sale recently of Mr. Churchill's race-horse Colonist II. The event is not of any importance to the electrical industry, but the conditions under which that sale and others at Newmarket are being carried out are worthy of note. The enclosure has been floodlit with such good results that when the scene was televised on the occasion mentioned above, only a small amount of supplementary lighting was necessary. The scheme was carried out by the Eastern Electricity Board with equipment supplied by the British Thomson-Houston Co., Ltd. Sixteen "Nine" floodlights with 1,000 W tungsten lamps have been employed. They have been mounted at safe distances from the ring and at an angle which eliminates glare, and the colour is such as will not distort the appearance of horses.

Line Laying by Helicopter

FOR the first time in the history of British electricity a helicopter is to be used in the laying of a power line—in this case over the Malvern Hills. By this method the Midlands Electricity Board hopes to avoid the destruction of hundreds of trees. The aim will be to span a 1,200 ft wide valley over closely growing trees to the south-west of the British Camp on part of the Eastnor estate. The idea is that of Mr. R. Mallet, sub-area manager, who as a member of the B.E.A. productivity team saw this method in operation in America two years ago. The project is expected to be started early in January, weather permitting.

OFFICIAL PUBLICATIONS THIS WEEK

E.R.A. REPORTS.

M/T. 108: *Improved Harmonic Analyser and Main Meter* (3s. 3d.). Q/T. 126: *Effect of Water in Transformers* (9s. 3d.). G/XT. 35: *Note on Quantity and Constitution of Gas Liberated During Arcing in Oil* (10s. 4d.). G/ST. 66: *Gases Liberated During Arcing in the Side-blast Baffle Circuit-breaker* (7s. 9d.). (*Obtainable from E.R.A., Thorncroft Manor, Dorking Road, Leatherhead.*)

NATIONAL PARKS COMMISSION. H.M.S.O. 2s.
Second Report. (*See page* 1177.)

MINISTRY OF FUEL & POWER STATISTICAL DIGEST —1950. H.M.S.O., price 15s.

REPORT OF THE RADIO RESEARCH BOARD—1950. H.M.S.O., price 1s. 9d.

Works Information

THE second of a series of booklets designed to assist industry in measures which improve industrial relations, has been published by the Ministry of Labour and National Service. The first was entitled, "This is a True Story" and the latest, appropriately, has been called "Another True Story." As its title suggests, the booklet has been based on an actual experience when four representatives of industry, a works manager, personnel manager, a foreman and worker (who was in an electrical department of a large firm) met a Ministry official and discussed works information. The pamphlet is a record of what each of those persons said at the meeting.

More Diesels for British Railways

BRITISH Railways are planning to add 573 diesel engines to their locomotive stock during the five years beginning 1953. At present there are 130 such engines in service and a further 84 have been authorised. The majority of new locos are expected to be used for goods operation and the new provisions will enable some 635 "expired" steam engines to be scrapped. The five-year plan provides for 432 diesel-electric engines of 350 h.p. and 141 diesel-mechanical engines of 150-200 h.p.; a first instalment of 57 of the former and 12 of the latter is to be included in the 1953 programme.

Electricity Charges to be Raised

CHAIRMAN of the E. Midlands Electricity Board, Mr. C. R. King, has warned of the possibility that the Area's three-farthing electricity tariff will probably be raised to a penny next summer. Explaining his statement, he said that for the fourth year, the Board would probably find itself "in the red," because of rising cost of coal and wage increases. Mr. King added that the Board was exercising the strictest possible economy.

Cardiff worried by Board's Bill

THERE appears to be some dissention in Cardiff over the South Wales Electricity Board's bill to the Corporation requesting payment of the difference between the new tariff and charges made when the local undertaking was city-owned. The Council has decided not to contest the bill, having heard, we understand, that the Ministry of Health is unable to overrule the Board. Their plea that the Act secured their rights to continue paying for current at cost price has been denied. It has been claimed that the former municipal undertaking was a flourishing concern, worth some £4,462,000, administered with due regard to local developments and making substantial contributions in relief of rates. As such it is entitled to consideration from the Board. Replying to these criticisms, the Board has pointed out that such facts as increased costs of generation and distribution have seemingly been forgotten. Discrimination and preferential treatment could not have been limited to Cardiff alone.

Decimal Storekeeping

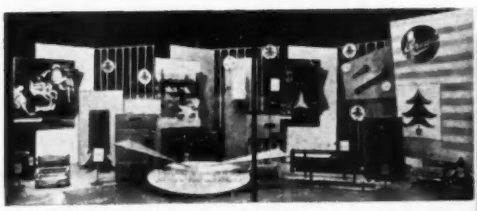
THE method of storekeeping of primary materials at the G.E.C. Union Works at Wembley has recently been completely revised, and by the use of horizontal storage, with proper utilisation of the overhead space, a substantial saving in room has been effected. In addition, the Brisch method of classification by seven-figure numerical code has been adopted. After careful consideration, a reduction in the number of standard stock sizes has been achieved, elimination of redundant stock leading to a saving of 28-30% by weight of the total metal stock.

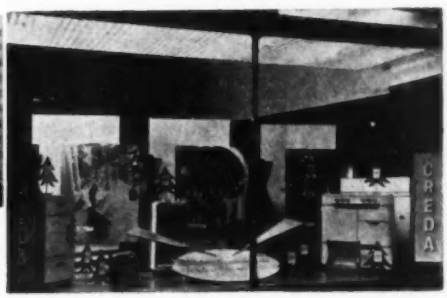
Equipment for Cathaleen Falls

FOLLOWING our report on the inauguration of two generating sets at Cathaleen Falls on the River Erne (December 6 issue), we note that nearly all the equipment was built by Asea Electric Ltd. or their associated company in Sweden. This included two 30,000 kVA vertical a.c. generators, nine transformers, four arc suppression coils, seven air-blast circuit-breakers, and two generator circuit-breakers. The same company also supplied transformers and a generator circuit-breaker for Cliff power station.

Boy cuts Oxfordshire Supply

THE story of how a 14-year-old boy cut the electricity supply to some 20,000 consumers by throwing a copper wire across overhead cables at Sandford, was told at Bullington juvenile court, Oxford, recently. It was stated that a supply failure occurred on the afternoon of October 28, and on investigation it was discovered that a piece





Two current displays in the showroom windows of Simplex Electric at Easy Row, Birmingham (right), and in Tottenham Court Road, London (above).

of copper wire thrown across the 33 kV cable had caused a short circuit and the lines to be snapped. The damage was estimated at £200. The boy admitted doing the damage and the case was adjourned for two weeks. Meanwhile the boy was sent to a remand home.

Cooker Thefts at Brighton

TWO employees of the South-Eastern Electricity Board were each sentenced to 12 months' imprisonment at Brighton recently for stealing three cookers valued at £89 from the depot in that town. Both pleaded guilty, one asking for 13 other cases to be taken into consideration, and the other ten. Prosecuting, Mr. D. A. Dean said that a total of 15 cookers and one water-heater, worth in all £473, had been stolen and the two men had received about £150 between them. Five other Brighton men pleaded guilty to receiving cookers and each was fined £30 or three months' imprisonment. They were not given time to pay

Calendars for 1952

FROM our many friends in the electrical industry we have received numerous calendars and good wishes for Christmas and the New Year. The ELECTRICAL TIMES cordially acknowledges those greetings and heartily reciprocates each one. Among those received during the past week, that from C. A. Parsons and Co., Ltd., depicts drawings of Newcastle-on-Tyne in the 16th century; from the British Thomson-Houston Co. Ltd., comes one illustrated by reproductions from natural colour photographs taken by their employees, another fine Derbyshire view enhances the D. P. Battery Co., Ltd.'s calendar, and the Liverpool Electric Cable Co., Ltd. show another picture of the sea. Others which have reached us are from Permali, Ltd., James Howden and Co., Ltd., and Monsanto Chemicals, Ltd.

NEWS IN BRIEF

A new library for students in all branches of engineering is to be opened shortly at the College of Technology and Commerce, The Newarke, Leicester. It will be in a separate building away from the main college. Trade catalogues, instruction handbooks and house journals will be welcomed by the Chief Librarian of the College, Lero Buildings, Painter St., Leicester.

Sir John Hacking, president of I.E.E. is appealing for contributions to the Institute's Benevolent Fund.

The Coal Utilisation Joint Council has changed its name to the Coal Utilisation Council, its pre-war title.

Five hundred apprentices and friends of the British Thomson-Houston Co. Ltd. enjoyed their Christmas ball recently.

We hear that Swansea's Parks and Burial Grounds Committee has approved the provision of two electric cremators at a cost of £10,440 in connection with the erection of a crematorium at Morriston cemetery.

A new radio telephone circuit is now in operation between Nairobi and Zomba, Nyasaland. It is operated at Nairobi by Cable and Wireless Ltd., and extensions are available beyond Kenya to Tanganyika and Uganda.

Member companies of the F.B.I. have been sent a letter by the Federation's president, Sir Archibald Forbes, outlining its policy on dividends.

Over 6,000 people in Fraserburgh are estimated to have visited the N. of Scotland Hydro-Electric Board's "Electrical Efficiency Exhibition" held in the town recently.

Electric Supply News

Aldershot

The Thames Conservancy Land Drainage Committee reports that the British Electricity Authority has under consideration the possibility of constructing a new generating station in the Aldershot-Farnborough district, and that the choice of a site will be influenced by the availability of water for cooling purposes. In this connection the Authority propose to construct a gauging station on the River Blackwater to measure the flow at North Camp, Farnborough, over a long period.

Aycliffe (Durham)

The annual report of the Aycliffe (Durham) Development Corporation, just published, refers to the fact that the Corporation had had to bear half the cost, estimated at £24,000, of diverting electric lines on the Corporation's estate. The report comments that it is not fair that such costs have to be borne and it is contended that the cost of the work should be covered by a Treasury grant.

Cork

At the recent meeting of the Cork Harbour Commissioners, a letter from the Ministry of Commerce and Industry was read stating that the E.S.B. proposed to construct a power station on its own property at Marina, Cork.

Eire

The Electricity (Supply) (Amendment) Bill introduced in the Dail recently authorises increases in the total amounts which may be advanced for the general purposes of the Electricity Supply Board, and for the electrification of rural areas. It is also to provide for the increase of certain pensions payable under the Electricity (Supply) Acts, 1927 to 1949, to amend those Acts in certain respects, and to provide for age limits for offices held by certain persons transferred to the Board's service.

Gt. Yarmouth

The local M.P. is anxious that work should soon start on the new generating station at the southern end of Great Yarmouth seafront. It is anticipated that work will not start until next August at the earliest, but Mr. A. Fells apparently intends to try and expedite matters.

South West Scotland

Farmers in Dumfries and Galloway have made a poor response to the 5-year plan for rural electrification prepared by the South West Electricity Board, the headquarters of the National Farmers Union of Scotland has told its Stewartry branch. A canvass of 1232 farms showed that 365 of those called upon were not sufficiently interested in the scheme to provide the board with the information necessary to prepare individual quotations. Moreover, out of 867 farmers to whom written quotations were sent only 267 had accepted the board's offer to provide facilities so that only about one farmer in five in the Dumfries and Galloway area had accepted the offer. In a subsequent discussion several members at the branch contented that all large farms had taken advantage of the scheme, but hill farms and small holdings could not afford to pay £180 for installation and an annual guarantee of £15.

Uttoxeter

The Trent River Board has consented to an application by the East Midlands Electricity Board to run overhead cables over the Dove at Doveridge and Rocester in connection with the reinforcement of the electricity supply to Uttoxeter and district. The River Board stipulated that there should be a minimum clearance of 30 ft from ground level to the lowest conductor, and that a proposed supporting pole on the east bank of the river at Doveridge should be moved to a new position on the landward side of the flood embankment.

Yorkshire

The Yorkshire Electricity Board is making preliminary investigations for the introduction of standardised tariffs for industrial consumers, it is reported.

LIGHTING SCHEMES

Bradford.—The Corporation's Street Lighting Sub-Committee has approved the programme for the first stage of converting street lighting from gas to electricity. Estimates are being sought from the Yorkshire Electricity Board.

Prittlewell.—A proposal for the conversion of street lighting in Shoebury from gas to electricity has been approved in principle by the T.C. A sum of £4,000 is to be included in next year's estimates to cover the cost.

Ramsgate.—Plans have been approved by the Town Council for the provision and installation of animated electrical features along the East Pier by the Franco-British Electrical Co. Ltd., Cost of installation (between £15,000 and £17,000) will be borne by the company. Charge for admission to the pier will be 6d., except in high season periods, when it will be 1s. After paying maintenance and running costs, 90% of remaining receipts will go to the company until cost of installation has been recouped. The 10% share of the Council will be guaranteed by the company at not less than £1,000 in the first year. When the installation is paid for, receipts—after deduction of maintenance charges—will be split, 40% for the Council, 40% for the company and 20% to a joint fund for replacement of features.

Company Activities

Dussek Brothers and Co. Ltd.

Consolidated trading profit for the year, before taxation, is £96,103 compared with £71,470 after providing £55,758 (*£39,666*) for taxation in the previous year. The combined net profit is £40,333 (*£31,776*). The final dividend is 16¼%, making 22½% (*same*), the sum of £13,000 (*£12,000*) is placed to stock reserve, £9,400 (*nil*) to taxation equalisation reserve, and the carry forward is £94,515 (*£90,361*).

Mexican Light and Power Co. Ltd.

Consolidated gross operating revenue (given in Canadian currency) for the three months ended September 30 was $6,275,639, of which operating and other expenses including taxation and depreciation absorbs $5,544,737, leaving a net operating revenue of $730,902. Financial charges on funded debt and construction loans amount to $541,828. Aggregate gross revenue from January 1 is $18,803,477 ($*16,714,379*), and net revenue $2,632,343 ($*1,411,961*).

Morphy-Richards

It is announced that the company is to issue 130,000 6% £1 redeemable Cumulative Convertible Preference shares at par, and 55,000 4s Ordinary shares at a price of 14s. each. Both classes of shares are being offered for subscription to ordinary stockholders, the Ordinary, by way of rights in the proportion of one for ten held.

Vera Cruz Electric Light, P. and T. Co.

For 1950, operating revenues totalled £120,564 (*£91,042*), of which operating expenses, taxes, etc. amounted to £111,418 (*£80,136*), leaving net operating revenue of £9,146 (*£10,906*). Add other income, less interest, making net income £8,884 (*£8,310 loss*). The deficit brought in is £105,196 (*£63,644 debit*), add adjustment of property retirement and replacement provision and special contingency of £17,467 (*nil*). Deducting the net income of £8,884 and adding loss on abandonment of diesel plant £949, the debit carried forward is £112,830.

Dividends Declared

Murex Ltd.—Interim Ordinary dividend of 6% (*5%*) payable on January 31. The directors state that the trading results for the six months ended October 31, 1951, compare favourably with the rate of earnings for the previous year.

Oriental Telephone Electric Co.—Interim of 4% (*same*).

Solus Teoranta.—Interim of 5% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Dec. 28.—Morpeth. Electrical installation in 56 houses in Spelvit Lane. F. K. Perkins, Borough Surveyor, 36 Bridge St.

Dec. 29.—Cork T.C. Supply of an 8-in. electric bench grinder and a portable electric bench sanding machine, all motors for 3-phase 380 V 5 c/s a.c. Philip Monahan, City Manager and Town Clerk, City Hall.

Dec. 31.—Cambridge. Electrical work in Queen Edith's Way primary schools. City Engineer and Surveyor, The Guildhall. Deposit £2 2s. (See Dec. 13 issue.)

Dec. 31.—Dalkeith T.C. Installation of sodium lighting along part of trunk roads A68 and A7. Burgh Surveyor, Municipal Buildings.

Dec. 31.—Manchester. Electrical installation at Moss House school, New Moston. City Architect, Town Hall. Deposit £1 1s. (See Dec. 13 issue.)

Dec. 31.—Newhaven U.D.C. Installation of electricity in 58 existing houses. Engineer and Surveyor, Council Offices, Fort Road.

Dec. 31.—Southgate T.C. Supply of castings (lamp columns, etc.) included in list of requirements during year ending March 31, 1953. J. T. W. Peat, Borough Engineer and Surveyor, Southgate Town Hall, Palmers Green, N.13.

Dec. 31.—Staffordshire. Fire Brigade requires supply of electric handlamps. Chief Fire Officer, Brigade H.Q., Pirehill, Aston, Stone.

Dec. 31.—Wrexham T.C. Electrical installation to 110 dwellings in course of erection. Borough Engineer and Surveyor, 31 Chester St. Deposit £1 1s.

Jan. 1.—Luton T.C. Electric wiring in 136 houses and installation of electrical services, wiring and equipment in six blocks of flats. Separate contracts. Borough Engineer, Town Hall. Deposit £2 2s. for each contract.

Jan. 1.—Stourbridge. Manufacture, supply and erection of electrically operated centrifugal pumping plant, including electric motors, switchgear, wiring, etc. Geo. P. Deeley, 13 Church St. Deposit £5 5s.

Jan. 2.—Leeds. Supply and erection of an electrically driven centrifugal pump. General Manager and Engineer, Waterworks Dept., Civic Hall.

Jan. 2.—Wandsworth B.C. Electric lamps included in list of supplies for year beginning April 1, 1952. R. H. Jerman, Town Clerk, Municipal Buildings, S.W.18.

Jan. 3.—Skelton and Brotton U.D.C. Wiring and installation of fittings in 44 houses on Brotton Coach Rd. estate. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland. (Advertised in this issue.)

Jan. 4.—Belfast. Supply and erection of (a) one 7½-ton and one 5-ton overhead travelling crane, one electric lift (2000 lb capacity), workshop machinery and equipment, self-contained transport weighbridge; and (b) lighting, heating and auxiliary power installations; for harbour power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. each item. (See Nov. 22 issue.)

Jan. 4.—Belfast. Supply and erection of complete coal-handling plant for Victoria power station, conveyors, automatic weighers and all ancillary equipment. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Nov. 8 issue.)

Jan. 4.—Belfast. Supply and erection of two complete sets of condensate chemical treatment plant for turbo alternators at Victoria power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. Also supply of sundry items in list of annual stores including switchgear, time switches, static transformers, street lighting, equipment, overhead line materials, cables, cookers, etc. Documents from Electricity Dept. East Bridge St., Belfast. Fee, 10s. (Both were advertised in Dec. 6 issue.)

Jan. 5.—Dagenham T.C. Electric lamps and supplies included in list of requirements for year beginning April 1, 1952. Borough Engineer and Surveyor, Civic Centre.

Jan. 5.—Salford. Supply of following for year beginning April 1, 1952 : (a) 140 W sodium lanterns and ancillary equipment; (b) 400 W mercury lanterns with same; (c) time switches with spring reserve; (d) 25ft. concrete columns; and (e) 16ft. concrete columns. Street Lighting Superintendent, Street Lighting Dept., Salford 3.

Jan. 7.—Selkirk T.C. Supply and erection of mercury lighting, comprising 31 lighting points, to Group A standard, along approx. 1,135 yd. Burgh Surveyor, Municipal Buildings.

Jan. 7.—Lancashire. Provision of street lighting on Warrington-Wigan-Preston trunk road A49 at Euxton. County Surveyor, County Hall, Preston. Deposit £2. (Advertised in this issue.)

Jan. 7.—Maidstone T.C. Rewiring and replacement of fittings in 34 houses in Queen's Rd. Borough Surveyor, Palace Ave.

Jan. 8.—Poplar B.C. Supply of electric lamps wanted for year beginning April 1, 1952. Town Clerk, Town Hall, Bow Rd., E.3.

Jan. 9.—Hepton R.D.C. Supply and installation of 31 lanterns, lamps, control gear and steel standards for Group A lighting on trunk road A646 at Charlestown, Yorks; also for supply of 11 lanterns, lamps, control gear and brackets; 140 W sodium lamps to be used. Surveyor to Council, District Bank Chambers, Hebden Bridge. Deposit £2 2s. (See Dec. 13 issue.)

Jan. 9.—Wrexham T.C. Supply and installation of 102 140 W sodium lighting units and 22 80 W fluorescent units on trunk road A483. Borough Engineer and Surveyor, 31 Chester St. Deposit £2 2s. (Advertised in this issue.)

Jan. 11.—Manchester. Electrical installation in home for aged persons, Nuthurst Rd., Moston. City Architect, Town

Hall. Deposit £1 1s. (See Dec. 13 issue.)

Jan. 11.—Littlehampton U.D.C. Wiring to electric light and power points in 12 houses on Wickbourne scheme. Engineer and Surveyor, Council Offices. Deposit £1 1s.

Jan. 12.—Galway. Supply and installation in pumphouse of two direct-driven horizontal centrifugal pumps and two electric motors with all necessary accessories. C.C.'s consulting engineer, E. R. Ryan, 1 Montpellier Terrace, Galway. Deposit £5 5s.

Jan. 14.—Aireborough U.D.C. Supply and installation of (a) columns and brackets, and fitting and wiring of lanterns and (b) supply of lanterns and all auxiliary gear; for 250 W mercury discharge lighting along 2½ miles of Leeds Rd. Engineer and Surveyor, Council Offices, Micklefield House, Rawdon, nr. Leeds. Deposit £2 2s. (See Nov. 15 issue.)

Jan. 14.—Belfast. Tenders re-invited for (*a*) two 48-in. bore and two 72-in. bore motor-operated sluice valves, and (*b*) seven penstocks 5 ft wide by 10 ft high, three 3 ft wide by 13 ft high and one 6 ft wide by 13 ft high, all motor-operated with emergency hand operating gear. These for Victoria power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

Jan. 14.—Wallasey T.C. Electrical installation in Mount Rd. and Park county infants' schools. Borough Architect, Town Hall. Deposit £1 1s.

Jan. 15.—Dunfermline. Supply and erection of 47 standards and installation of sodium lighting to Group A along trunk road A985. Lighting Superintendent. City Chambers.

Jan. 21.—East Retford R.D.C. Supply and erection of electrically driven borehole pumping plant at Everton pumping station. Names to Council's Consulting Engineer, John H. Haiste, 4 Queen Sq., Woodhouse Lane, Leeds 2.

Jan. 21.—Ealing T.C. Lamp columns included in list of supplies needed for year ending March 31, 1952. Borough Engineer and Surveyor, Town Hall, Ealing W.5.

Jan. 22.—Edinburgh. Supply and erection of water turbine and 80 kW alternator with necessary wiring and switchgear at Fairmilehead Filters. City Water Engineer, 6 Cockburn St.

Jan. 31.—Norwich. Supply and erection of two sets of electrically driven vertical spindle centrifugal foul sewer pumps and ancillary equipment. City Engineer, City Hall. Deposit £5.

Jan. 31. — Newcastle-on-Tyne. Electric lighting and power installation in Denton Sq. primary school. Applications by Jan 7. to consulting engineers, R. W. Gregory and Partners. Deposit £5 5s. (Advertised in this issue.)

Feb. 1.—Ireland. Supply and erection of hydro-electric generating plant at Inniscarra and Carrigadriod stations on River Lee. Documents from Chief Generation Engineer, Electricity Supply Board, 27 Lower Fitzwilliam St., Dublin, C.18. Deposit £5 5s. (See Nov. 1 issue.)

Feb. 11.—Manchester. Electrical installation at Crab Lane county school, Blackley. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

No date stated.—Lothians and Peebles. Electrical work in erection of police station and house at Roslin. County Architect of Midlothian, 32 Palmerston Place, Edinburgh 12.

No date stated.—Midlothian. Supply of 94 electric cookers and 94 electric wash boilers for West Calder housing scheme. County Architect, 32 Palmerston Place, Edinburgh 12.

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Jan 11.—S. Rhodesia. Electricity Supply Commission requires 118 miles of s.c.a. conductor equivalent to ·075 sq in. copper; 150 miles same equivalent to ·2 sq in. copper; and 276 pairs twisted joint sleeves for ·07559 in. equivalent copper in s.c.a. conductor. P.O. Box 377, Salisbury. B.o.T. (Ref. CRE (IB) 77883/51). *

Jan. 15—India. Manufacture, supply and installation of nine radial crest gates and hoist equipment for Konar Dam, for Damodar Valley Corp. B.o.T. (Ref. CRE (IB) 77957/51).*

Jan. 16.—S. Rhodesia. Electricity Supply Commission invite tenders for various quantities of disc insulators and insulator fittings. Commission's address is P.O. Box 377, Salisbury. Deposit £2. B.o.T. (Ref. CRE (IB) 77881/51).*

Jan. 17.—S. Rhodesia. Supply of various quantities of cables and accessories to sundry specifications, for Umniati B power station. Cable boxes, terminations, Pyrotenax accessories and conduit also required. Electricity Supply Commission, P.O. Box 377, Salisbury. Deposit £5. B.o.T. (Ref. CRE (IB) 77755/51).*

Jan. 18.—S. Rhodesia. Supply of 12 single pole 88 kV; three 66 kV; 27 33 kV and 96 11 kV

Your Queries — Answered

"Marmet" kettles, makers of? T.E.—Martins Metal Industries Ltd., Craven House, 121 Kingsway, W.C.2. (22247)

"Volmar" record players, makers of? L.E.—Industrial Sound Equipment Ltd., 141 High St., Brentford. (22254)

Electric pokers, firelighting, makers of? E.B.—Sarum Electric Ltd., 68 Brown St., Salisbury, Wilts. Storr Supplies Ltd., Balham Rd., Edmonton, N.9. (22268)

"Rob Roy" irons, makers of? E.M. — Scottish Precision Eng. Co., 27 Cadogan St., Glasgow C.2. (22276)

FURTHER ANSWER

"A.C.S." thermostats, makers of? C.W.—Robert Maclaren and Co., Ltd., Eglinton Works, Kilbirie St., Glasgow C.5, state that they are the manufacturers of "A.C.S." thermostats and not the A. C. Sphinx Sparking Plug Co. (22284)

The above are selected from questions we have answered this week. If you have a query, send it to us.

station type lightning arresters complete. Also 320 three-pole l.t. meter protectors for Electricity Supply Commission. P.O. Box 377, Salisbury. Deposit £2. Box (Ref. CRE (IB) 77882/51).*

Jan. 23.—India. Supply of iron-clad service cutouts for 250 V 50 c/s supply working current. Secretary, Store Purchase Committee, Govt. of Travancore-Cochin, Trivandrum. B.o.T. (Ref. CRE (IB) 78222/51).*

Jan. 24.—South Africa. Tenders invited for supply of 11,000 Lightning Protectors. Chairman, Tender Board and Supplies Office, 271 Visagie St. (P.O. Box 371), Pretoria.

Jan. 24.—Uruguay. Usinas Electricas y Telefonos del Estado invite tenders for supply and installation of automatic telephone exchange of 6,000 members. B.o.T. (Ref. CRE (IB) 77819/51).*

Jan 31.—South Africa. Supply of materials and works to complete White River electricity distribution network. Consulting Engineer is J. S. Clinton, P.O. Box 4648, Johannesburg. Deposit £3 3s.

Feb. 11.—Uganda. Electricity Board invites tenders for supply and installation of 11 kV and l.v. cables and accessories associated with generation plant and feeder circuits at Owen Falls H.-E. power station. Documents from Kennedy and Donkin, Alliance House, 12 Caxton St., London S.W.1. Deposit £2 2s. (Advertised in this issue.)

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Clyde Electric Installations (Manchester) Ltd. Resolution for voluntary winding-up passed at meeting on Dec. 7. W. Furniss Riding, C.A., 1 Cooper St., Manchester 2, was appointed liquidator.

BANKRUPTCY ACTS

Dividends

Liverpool. Robert L. Foggin, electrical engineer trading as "Tithebarn Radio Co." at 63 Tithebarn St., as "Crosby Radio Co." at 75 Crosby Rd. North, and as "High Bridge Radio Co." at High Bridge Rd., Newcastle-on-Tyne. Supplemental dividends of 2s. 6d. in £ payable at Official Receiver's Office, West Africa House, 25 Water St., Liverpool, to-morrow (Friday).

PRICES OF CABLE METALS AND OTHER MATERIALS
(at time of going to press)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, ,, "English" quality ...	176 10 0	
Tin (99·99·75%) ... ...(Cash)	920-925	—
,, (3 months)	915-917½	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.) ...	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

CONTRACTS PLACED

Peterborough. Improvement of street lighting in seven roads, Eastern Electricity Board, £4,650.

Also electrical work in 134 houses on Eastfield estate, M. F. Hansen, £4,370; and same in 54 houses, Peterborough General Electric Co., Ltd., £1,775.

Plymouth. Supply and erection of 300 street lighting columns, brackets and lanterns, General Electric Co., £3,843.

Ryton-on-Tyne U.D.C. Electrical installation in 56 houses on Garden House estate, Storey and Crowe.

South Shields T.C. Rewiring at Barnes county junior school, Watson Norie Ltd., £1,510; same at Westoe county secondary school, R. Ramsay and Son, £2,550.

Stepney B.C. Electrical installation in 5 blocks in Sidney St., London Electricity Board, at £16,672.

Stockton-on-Tees T.C. Electrical installation in houses on Mount Pleasant estate, Sykes and Son, £3,495.

Tynemouth T.C. Electrical installation in 74 houses at Marden and Balkwell, F. Grey, £2,365.

TRADE NOTES

Changes of Address. As from January 1 the address of the Purchasing Department of the London Electricity Board will be 6/9 Bridgewater Square, E.C.1. Telephone, Monarch 9898.

The Midland area sales office of Tufnol Ltd. has moved to Cornwall Buildings, 45 Newhall St., Birmingham 3. The telephone no. Central 5651 remains unaltered, but the telegraphic address has been changed to Tufnol, Birmingham 3.

The London Sales Office and Warehouse of the Rubber and Plastic Cables Division of Standard Telephones and Cables Ltd. has been transferred to 48 North Row, Mayfair, W.1. Telephone Mayfair 4392.

The Manchester office address of Bruce Peebles and Co., Ltd., is now at 26 Corporation St., Manchester 4. Telephone No. Deansgate 7106. The office, as formerly, is under the management of Mr. H. V. Balm.

Factory Site. Allocation of a 37-acre site at Wythenshawe to Ferranti Ltd. has been approved by Manchester Estates and Management Committee. The factory is for the manufacture of electrical equipment and work in conjunction with a new Ministry of Works plant for making radar equipment at Moss Nook.

Representative. Ekco-Ensign Ltd. announce the appointment of Mr. H. C. B. Woodcock, as special representative calling upon Graded Users in the South Eastern and North Western areas of Birmingham. He will operate from the company's Midland sales office at 40/42 Summer Row, Birmingham 3.

New Year Holiday. The works of Bruce Peebles and Co., Ltd., will close on Monday evening, December 31, 1951, and reopen on Friday morning, January 4, 1952. No goods will be received or despatched during the holiday period.

Co-operation. Philips Electrical Ltd. announce that Philips Phonographic Industries, Baarn, Holland, has reached agreement with Columbia Records Inc., U.S.A., to co-operate on a world-wide basis for the exploitation of their record libraries, with effect from January 1, 1953.

BUSINESS PROSPECTS

HOME

Accrington T.C. Construction of shops and flats in Fern Gore Ave. Borough Engineer and Surveyor, J. Wallace Buick, Town Hall.

Adwick (Yorks) U.D.C. It is proposed to build 70 houses at cost of £98,695. Also council is to develop a shopping centre in Woodlands estate. Council's Architect, Council Offices.

Arbroath. Dean of Guild Court has approved erection of 27 houses in Cliffburn Rd.

Beaumaris (Anglesey) T.C. Erection of block of houses and flats on Cae Bricks site. Architect is S. Colwyn Foulkes, Merton Place, Pwllycrochan Ave., Colwyn Bay.

Billingham U.D.C. Construction of 150 houses (in four contracts) on Roseberry Rd. site. Council's Architect, Kitching and Co., 21 Albert Rd., Middlesbrough.

Blyth T.C. has provisionally been allocated 140 houses for 1952.

Bridgend (Glam.) U.D.C. Construction of 34 houses on West House site. Engineer and Surveyor, D. J. Amos, Council Offices, Glan-ogwr, Bridgend.

Burgess Hill U.D.C. Erection of 18 houses and 6 flats on St. Andrew's Rd. site. F. E. R. Hogg, Engineer and Surveyor, Council Offices, 32 Church Rd.

Carrickfergus T.C. Plans approved for erection of 119 bungalows on Ulster Cottage estate, Eden; and an R.U.C. barracks in Green Street.

Castle Wood (Northumb.) R.D.C. Approval granted in principle for scheme at Dinnington Colliery involving erection of some 650 houses, with old persons' bungalows, shopping centre, etc. About 250 houses will be built within next two or three years.

Chanctonbury (Sussex) R.D.C. R.C. Church is to be built at Pulborough.

Cheshire. Extensions proposed for Grange secondary schools, and also a new secondary school at Ellesmere Port.

Chesterfield T.C. Block of 18 flats is to be built.

Down. Approval sought for erection of clinic at Gregagh.

East Barnet. J. Cubitt and Partners, 25 Gloucester Place, London, W.1, have been recommended as architects for new junior school on Bevan estate.

Eastbourne T.C. Tenders expected to be invited shortly for erection of 118 houses at Langley Village.

Edinburgh. Rowand Anderson, Kinismouth and Paul, Rutland Sq., are architects for adaptations in Princes St. for Clydesdale and N. of Scotland Bank Ltd. Estimated cost, £10,000.

Essex. Modern technical school is to be built for Harlow New Town at estimated cost of £321,975.

Gateshead T.C. First part of scheme for a new £150,000 civic centre at Shipcote to be started shortly. Multi-storeyed flats to be built in Central Area. Chief Architect is H. J. Cook. Also Huwood Mining Machinery Co. Ltd., Team Valley, have asked for permission to build 100 houses for employees.

Goole. Railway Executive are to reconstruct the railway station.

Hinckley U.D.C. Council to build 28 houses on Sketchley Hill estate, Burbage, 48 on Red Hall estate, Barwell, and 28 on Mill Lane estate, Earl Shilton.

Leeds. T.A. Lodge of Lanchester and Lodge, 10 Woburn Sq., W.C.1, has been appointed architect for erection of a hospital.

Leighton Buzzard U.D.C. Erection of 22 houses on Clarence Rd. estate. Architect, H. A. Roll, 15 Bridge St.

Manchester. Council recommended to apply for sanction to borrow several thousands of pounds for various projects, including hostel at West Didsbury, additions to Regional College of Art and modernisation of "Newholme," also at West Didsbury.

Morley T.C. Seven blocks of four flats to be built in Asquith Ave. Also, erection of six shops with flats on Garden House Lane estate, Tingley; Housing director is M. H. Brook, National Provincial Bank Chambers, Queen St.

Nelson T.C. Scheme approved for erection of 60 houses on Marsden Park estate.

Newcastle-on-Tyne. Plans approved for 120 flats and 82 maisonettes on Hirdhaugh St. scheme.

Northallerton. It is proposed to spend £25,500 on erection of new wing and adaptations at Oak Mount for use as home for aged.

Northampton R.D.C. Eighty-two houses to be erected on twelve sites.

Northumberland. Plans prepared for secondary school at Newburn to cost £160,000. County Architect is C. C. Brown, County Hall, Newcastle.

Nottingham. Erection of secondary school at Clifton. R. M. Finch, City Engineer and Surveyor, The Guildhall.

Peterborough. City Council has received allocation of 250 houses for 1952. Permission received for erection of hostel for aged in Thorpe Rd. Plans by C.C. Architect, Town Hall.

Sheffield. Council recommended to appoint Collins Melvin and Partners, of London as architects for erection of College of Technology.

South Shields. Plans submitted to Council for erection of a total of 635 houses.

Stanley (Durham) U.D.C. is to acquire land at Cathgate for erection of about 200 houses.

Stoke-on-Trent. City has received an allocation of 1,000 houses.

Stone (Staffs) R.D.C. Council has been asked by N.C.B. to consider the erection of 200 houses at Cocknage near Barlaston.

Sunderland. Infants' school costing £60,000 to be built at Pennywell, and a primary school at £80,000. It is proposed to build 1,200 houses at Grindon. Borough Architect, H. C. Bishop, Grange House, Stockton Rd.

Tadcaster R.D.C. A total of 74 dwellings are to be erected on various estates. Council's Architects, Anthony Steel and Owen, 89 Albion St., Leeds.

Wallsend T.C. It is proposed to build multi-storeyed flats in Rosehill Rd.

Wellingborough U.D.C. Next year's allocation of houses numbers 160. It is proposed to erect 60 houses.

West Hartlepool T.C. Tenders to be invited for erection of 106 houses. Plans by Borough Architect.

Whitley Bay U.D.C. Tenders invited for construction of 20 houses in Cauldwell Ave. Surveyor is E. Roberts.

York. Erection of 100 houses on Moor Lane estate. Chas. J. Minter, City Engineer and Architect, Guildhall.

OVERSEAS

Nigeria. Trade Centre has been established at Kano by Government's Education Dept. (Technical), where instruction will be given in various trades. Director of Education would like catalogues, price lists, etc., of tools, equipment and machinery for mechanical and electrical engineering.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Apollo. 701,439, Class 9. Radiogramophones, wireless and television sets, etc. J. B. Manufacturing Co. (Cabinets) Ltd., 86 Palmerston Rd., Walthamstow, E.17.

Ashley. 689048. Class 9. Switches, fitted switch holders, plugs, sockets, connectors. 700,751. Class 11. Lampholders and ceiling roses. Ashley Accessories Ltd., Morecambe Rd., Ulverston, Lancaster.

By-way. 702,232. Class 9. Flat irons and vacuum cleaners, all electrically operated. A. J. Norton and Sons, 28 Key Hill, Birmingham 18.

Calidec. 700,185. Class 11. Electric tubular heating apparatus. Early Crops Ltd., 32 Exchange Buildings, Stephenson Place, Birmingham 2.

Lumos. 702,351. Class 9. Electric appliances, being parts of wiring installations for use in controlling lamps. 702,352. Class 11. Electric lamps. Thorn Electrical Industries Ltd., 105/109 Judd St., W.C.1.

Philips, with design. B669,320. Class 9. Electrical apparatus and instruments, etc. B669,321. All goods in Class 10. Philips Electrical Ltd., Century House, Shaftesbury Ave., W.C.2.

Sunglow. 697,898. Class 11. Lighting fittings made of glass. S. and W. (Lighting) Ltd., Brierley Hill Glassworks, Brierley Hill, Staffs.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Alytron Radio and Television Co., Ltd. Cap.: £100. Perm. dirs.: C. R. Pearce, Alytra, Clewer Village, Windsor, and P. E. Seppings.

Browning and Voss, Ltd., 50, Bow Lane, Cheapside, E.C.4. Mechanical, electrical, electronic, wireless, television and general engineers, etc. Cap.: £100. Dirs.: W. H. Grimmer, J. M. Lloyd Jones and R. A. Voss.

Carnor, Ltd., 37 Soho Sq., W.1. Mechanical, electrical and general engineers, etc. Cap.: £5,000. S. L. Lesser signs as director.

Richard Hardy (Electrical Engineers) Ltd., 24 Spring St., Huddersfield. To take over business carried on at Prince Royd, Birchencliffe, Huddersfield; and at 24 Spring St., Huddersfield, by Richard Hardy. Cap.: £5,000. Dirs.: R. Hardy and others to be appointed by subs.

Hart Accumulator Co. Ltd., Chequers Lane, Dagenham Dock, Essex. Cap.: £100. Dirs.: D. G. Haigh and W. E. Thorn.

Charles A. Klemm Ltd., 153 Moorgate, E.C.2. Electrical and general engineers, etc. Cap.: £5,000. Dirs.: C. A. Klemm and Elvira M. Klemm.

Leonard's Electrical (Chippenham) Ltd., 17a Timber St., Chippenham, Wilts. To take over business of an electrical and radio engineer carried on at Chippenham by Leonard Parry. Cap.: £20,000. Dirs.: L. Parry, E. W. Coker Milsom, G. H. Burdge and Mrs. M. Parry.

Main Refrigation Ltd. To acquire the whole or any part of the issued share capital of Bolinders Refrigerators, Ltd., and to trade as manufacturers of and dealers in refrigerators and cold storage machinery, etc. Cap.: £100,000. Dirs.: not named. Subs.: J. Pemberton and E. T. Horne, 1 Bank Bldgs., Princes St., E.C.

Royston-Johnstone Engineering, Ltd. General, mechanical, electrical, motor, marine and precision engineers, cellulose and paint sprayers, etc. Cap.: £100. Dirs.: R. L. R. Fly, 29 Stoneleigh Ave., Brighton 6; and E. Johnstone.

W. Sagar (Contractors) Ltd., 82R Wakefield Rd., Smithies, Barnsley. Electrical contractor carried on at Smithies, Barnsley, by W. Sagar. Cap. £1,000. perm. man. dir.: W. Sagar.

Silson Radio Ltd., 261a Town St., Bramley, Leeds. Cap.: £5,000. Perm. dirs.: E. Silson and Mrs. B. Silson.

Harold Simpson, Ltd., 140-142 St. James St., Burnley. Manufacturers of and dealers in wireless and television sets, etc. Cap.: £3,000. Perm. man. dir.: H. Simpson.

MEETINGS TO NOTE

FRIDAY, DEC. 28

JNR. INSTN. OF ENGINEERS.—"Hydro-Electric Power Developments." J. Foster Petree. 39 Victoria St., S.W.1, 6.30 p.m.

WEDNESDAY, JAN. 2

I.E.E. (Tees-side sub-centre).—"Protection of Electrical Power Systems." H. Leyburn and C. H. W. Lackey. Cleveland Scientific and Tech. Inst., Middlesbro' 6.30 p.m.

THURSDAY, JAN. 3

I.E.S. (Nottingham Centre).—"Lighting of Modern Ocean Liners." T. Catten. E. Midlands Board, Smithy Row, 5.30 p.m.

I.E.S. (Exeter Group).—"Neon Lighting." C. Higgins. Providence Hall, Northernhay St., 7 p.m.

FRIDAY, JAN. 4

I.E.S. (Bath and Bristol Centre).—"Neon Lighting." C. Higgins. S.W.E.B., Old Bridge, Bath, 7 p.m.

I.E.S. (Birmingham Centre).—"Modern Transport Lighting." W. E. J. Drake. Imperial Hotel, 6 p.m.

I.E.S. (Huddersfield Group).—"Use and Misuse of Fluorescent Lighting." T. C. Holdsworth. Electricity Showroom, Market St., 7.15 p.m.

SATURDAY, JAN. 5

BIRMINGHAM ELECTRIC CLUB.—Children's Party at Grand Hotel, 3 p.m.

MONDAY, JAN. 7

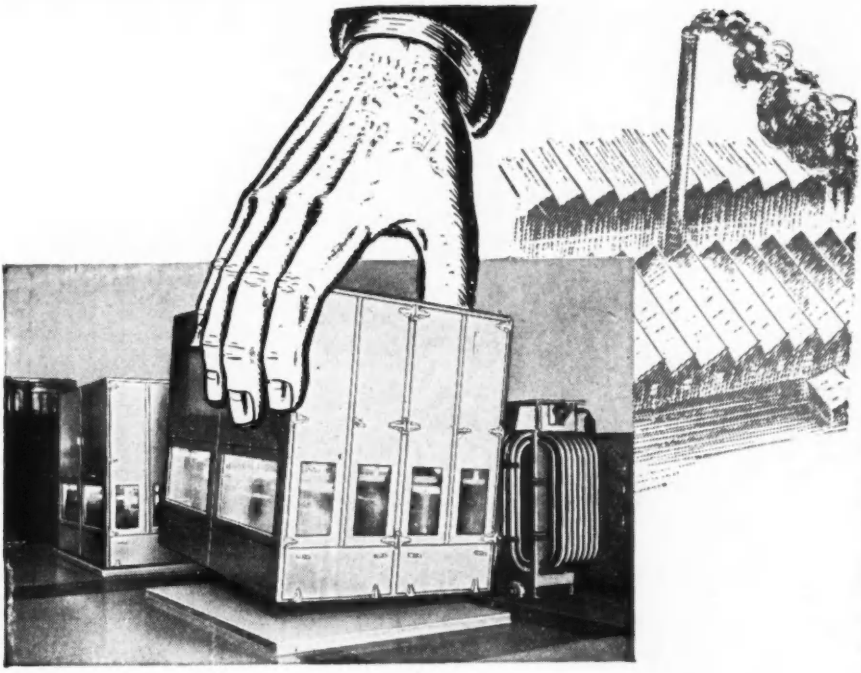
I.E.E. (London Measurements section).—Section dinner dance at Cafe Royal.

I.E.E. (Mersey and N. Wales Centre).—"Modern Developments in Electric Welding." H. G. Taylor. Liverpool Royal Instn., Colquith St., 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"Automatic Monitoring of Broadcast Programmes." H. B. Rantzen, F. A. Peachey and C. Gunn-Russell. King's College, Newcastle, 6.15 p.m.

I.E.E. (S. Midland Centre).—"Protection of Electrical Power Systems—Critical Review of Present-day Practice and Recent Progress." H. Leyburn and C. H. W. Lackey. James Watt Memorial Inst., Gt. Charles St., Birmingham, 6 p.m.

I.E.E. (Western Utilisation Group)—Annual dinner.



A HEWITTIC Rectifier fits neatly into the industrial scheme—providing in the simplest way a supremely reliable direct current supply for the operation of cranes and conveyors, D.C. locomotives and battery trucks, D.C. motor-driven machines, electrolytic plant, magnetic equipment—for all the hundred and one applications where D.C. is required.

Almost as simple to install as the illustration suggests, since no crane facilities or special foundations are necessary, fitting easily into existing spaces (due to flexible unit construction); operating COMPLETELY UNATTENDED; available up to the largest capacities.

OVER 1¼ MILLION KW IN WORLD-WIDE SERVICE

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What satisfaction in a job well done. It is *inevitable* with Metallic quality and consistent accuracy.

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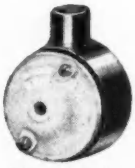

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CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. 0d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY AND COUNTY OF NEWCASTLE-UPON-TYNE EDUCATION COMMITTEE

Denton Square Primary School

TENDERS are invited from electrical contractors for the ELECTRIC LIGHTING AND POWER INSTALLATION in the above school. Firms wishing to tender should apply for particulars before noon on Monday, January 7, 1952, enclosing (i) a deposit of 5 gns, made payable to the Newcastle-upon-Tyne Education Committee (which will be refunded on receipt of a bona-fide tender), and (ii) evidence that an electrical contract exceeding £5,000 in value in a public or commercial building has been carried out satisfactorily by the contractor during the last five years.

Plans and specifications prepared by the Department's Consulting Engineers, Messrs. R. W. Gregory and Partners will be issued to suitable applicants not later than January 14, 1952, and tenders are to be returned not later than noon on Thursday, January 31, 1952.

No tender will be considered which is not enclosed in the official tender envelope provided which must not bear any name or mark indicating the sender.

The Education Committee do not bind themselves to accept the lowest or any tender.

H. V. LIGHTFOOT,
Director of Education.

City Education Office,
Northumberland Road,
Newcastle-upon-Tyne 1. (P 437)

BOROUGH OF WREXHAM

TRUNK ROAD GROUP "A" STREET LIGHTING

TENDERS are invited for the SUPPLY and INSTALLATION of 102 No. 140 watt Sodium Lighting Units and 22 No. Triple 80 watt Fluorescent Lighting Units on Trunk Road A.483 within the borough.

Drawings and conditions of contract may be inspected at the office of the Borough Engineer and Surveyor, 31 Chester Street, Wrexham, from whom copies of the specification and forms of tender may be obtained on payment of a deposit of two guineas, which will be refunded on receipt of a bona-fide tender.

Tenders, in plain sealed envelopes endorsed "Trunk Road Lighting," should reach the undersigned not later than noon on Wednesday, January 9, 1952.

The Council do not bind themselves to accept the lowest or any tender.

PHILIP J. WALTERS,
Guildhall, Wrexham. Town Clerk.
December 14, 1951. (P 448)

CITY AND ROYAL BURGH OF DUNFERMLINE

TRUNK ROAD A985 (ADMIRALTY ROAD)
GROUP "A" STREET LIGHTING SCHEME

TENDERS are invited for the supply and erection of 47 standards and installation of sodium discharge lighting to Group "A" standard on the above road.

The drawing may be seen and a copy of the specification and form of tender may be obtained at the office of the Lighting Superintendent, City Chambers, Dunfermline.

Tenders, in plain sealed envelopes, endorsed "Trunk Road Lighting" must be delivered to the Subscriber not later than January 15, 1952.

The Town Council do not bind themselves to accept the lowest or any tender.

J. DOUGLAS,
City Chambers, Dunfermline. Town Clerk.
December 14, 1951. (P 495)

UGANDA ELECTRICITY BOARD

OWEN FALLS HYDRO-ELECTRIC POWER STATION

TENDERS are invited for the supply, delivery (F.O.B. British port) and installation of 11 kV and lower voltage CABLES AND ACCESSORIES associated with generation plant and feeder circuits. Form of tender, conditions and specification, No. UEB.41/26, in triplicate, may be obtained from Messrs. Kennedy and Donkin, Alliance House, 12 Caxton Street, London, S.W.1, on or after January 2, 1952, on payment of a deposit of £2 2s., which will be refunded upon receipt of a bona fide tender or return of documents. Extra copies of the contract documents may be obtained at £2 2s. per set, which sum will not be returnable. Cheques should be made payable to the Uganda Electricity Board.

Tenders must be submitted in duplicate in a sealed envelope endorsed on the left-hand corner "Tender for Specification UEB.41/26" and addressed to the Chairman, Uganda Electricity Board, c/o. Messrs. Kennedy and Donkin, Alliance House, 12 Caxton Street, London, S.W.1, and delivered not later than 12 o'clock noon on February 11, 1952.

The Board do not bind themselves to accept the lowest or any tender. (P 470)

LANCASHIRE COUNTY COUNCIL

TO CONTRACTORS

TENDERS are invited for the work involved in the provision of STREET LIGHTING on the Warrington-Wigan-Preston Trunk Road A.49 in the parish of Euxton.

Plans and details may be inspected at the offices of Mr. James Drake, B.Sc., M.I.C.E., M.I.Mun.E., County Surveyor and Bridgemaster, County Hall, Preston, at any time during customary office hours, and conditions of tender, conditions of contract, specifications, bill of quantities and form of tender may be obtained by depositing the sum of £2 (two pounds) with the County Surveyor and Bridgemaster. This deposit will be refunded only on receipt of a bona fide tender.

Cheques are to be made payable to the Lancashire County Council.

Tenders must be forwarded to the undersigned not later than 10 a.m. on Monday, January 7, 1952, in a sealed envelope which must not bear any name or mark indicating the sender.

R. ADCOCK,
Clerk of the County Council.
County Hall, Preston. (P 474)

HEPTON RURAL DISTRICT COUNCIL

STREET LIGHTING

TENDERS are invited for the supply and installation of 31 No. Lanterns, Lamps, Control Gear and Steel Standards for Group "A" Lighting on the Leeds-Halifax-Preston Trunk Road A646 at Charlestown, Hebden Bridge, Yorks, in the Rural District of Hepton.

Tenders are also invited for the supply of 11 No. Lanterns, Lamps, Control Gear and Brackets.

140-watt Sodium Discharge Lamps in enclosed-type lanterns are specified with a mounting height of 25 ft.

Drawings and conditions of contract may be inspected at the office of the surveyor to the council at District Bank Chambers, Hebden Bridge, from whom copies of the specification and form of tender may be obtained, on payment of a deposit of £2 2s. which will be refunded on receipt of a bona fide tender.

Tenders in plain sealed envelopes, endorsed "Sodium Lighting," should reach the undersigned not later than noon on Wednesday, January 9, 1952.

No undertaking is given to accept the lowest or any tender.

E. H. BLACKBURN,
Clerk to the Council.
District Bank Chambers, Hebden Bridge.
December 14, 1951. (P 411)

CITY OF BELFAST

Electricity Department

VICTORIA POWER STATION

TENDERS are re-invited for the SUPPLY, DELIVERY AND ERECTION, etc., of:—

Section "A"

Two 48-in. bore and two 72-in. bore motor operated SLUICE VALVES for installation in the condenser circulating water culverts, the valves to be complete with cast iron specials for installing in reinforced concrete culverts, and 6 and 4 in. bore drain and air release valves.

Section "B"

SEVEN PENSTOCKS 5 ft wide by 10 ft high; THREE PENSTOCKS 3 ft wide by 13 ft high, and ONE PENSTOCK 6 ft wide by 13 ft high, these penstocks to be motor operated with emergency hand operating gear.

Tenders are required for the whole of the above work, but each section will be considered independently, and tenderers may quote for either Section "A" or Section "B" or both. The Corporation will consider only offers for the whole of the plant specified in each section.

Form of tender (No. N.1156), conditions and specification, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of 5 gns., which will be refunded provided a bona fide tender be lodged and not withdrawn. Extra copies of the contract documents may be obtained at 3 gns. per set; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Low Pressure Valves and/or Penstocks, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, January 18, 1952.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
December 15, 1951. (P 475)

SKELTON & BROTTON URBAN DISTRICT COUNCIL

TENDERS FOR ELECTRICAL WIRING, ETC.

THE Council invite tenders for the electrical wiring and installation of electrical fittings in respect of 44 houses on their Brotton Coach Road estate.

Plans may be inspected and specification and form of tender obtained at the office of the Engineer and Surveyor, Council Offices, Skelton-in-Cleveland.

Tenders enclosed in plain sealed envelopes endorsed "Electrical Installations" must be delivered to the undersigned not later than 10 a.m. on Thursday, January 3, 1952.

The Council do not bind themselves to accept the lowest or any tender.

F. WILKINSON,
Clerk of the Council.

Council Offices, Skelton-in-Cleveland.
December 17, 1951. (P 481)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment from engineers with practical workshop experience and ability in the handling of men:—

ASSISTANT MAINTENANCE ENGINEER (MECHANICAL)

Salary in accordance with the revised N.J.B. Schedule A, Class "G," Grade 9 (£621 to £648 per annum).

Rye House Generating Station, near Hoddesdon, Hertfordshire.

This station will have an ultimate capacity of 180MW (Class H.)

Experience in the maintenance of modern pulverised fuel boilers, coal and ash handling plants is essential. Some experience in the maintenance of turbine house and other generating station plant will be an advantage.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than January 12, 1952. Envelopes should be endorsed "Assistant Maintenance Engineer (Mechanical)—Rye House."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 490)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following posts:—

PERSONNEL OFFICER

A vacancy will shortly exist for a Personnel Officer on the staff of the Secretary at the Head Office of the Board.

The commencing salary will be within the range of £1,250 to £2,000 per annum, according to qualifications and experience and the conditions of service will initially be those prescribed by the Board from time to time. The salary and conditions of service will, in due course, be those determined by the appropriate negotiating machinery. Candidates should have a wide knowledge of all personnel matters, preferably obtained within the Electricity Supply Industry, and a considerable experience of the negotiations and applications of agreements covering wages, salaries and conditions of service. The duties of the successful candidate will include co-ordinating responsibilities in respect of training, establishment and welfare policy.

Forms of application, obtainable from the Secretary, should be returned to him in envelopes endorsed "Personnel Officer," at Southern Electricity House, Littlewick Green, Maidenhead, not later than January 14, 1952.

MAINTENANCE AND OPERATION ENGINEER

Sub-Area Engineer's Department, Portsmouth. Salary N.J.B. Class "J", Grade 7, Column 1 (£792 per annum), N.J.B. conditions of service.

The person appointed will be responsible to the Sub-Area Engineer for the co-ordination of maintenance and operation in the whole of No. 3 (Portsmouth) Sub-Area.

Candidates must have had experience in the operation and maintenance of large distribution networks involving substation plant and equipment and mains up to 33 kV. Applicants should preferably be Corporate Members of the Institution of Electrical Engineers, or have equivalent qualifications.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, must be returned to him in envelopes endorsed "Maintenance and Operation Engineer" not later than January 7, 1952.

The successful candidates for the above appointments will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

F. W. KEMPTON,
Secretary.

December 20, 1951. (P 463)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the position of OPERATION AND EFFICIENCY ENGINEER at Hams Hall "A" Generating Station. Salary will be in accordance with Schedule A, Class J, Grade 5 of the National Joint Board Agreement, commencing at £917 per annum.

Candidates should preferably possess a university degree in engineering, or be corporate members of the Institution of Electrical and/or Mechanical Engineers. Applicants with Higher National Certificate in electrical and mechanical engineering, or who hold equivalent qualifications, will be given consideration. The successful applicant will be responsible for the efficiency and operation of the generating station plant. Operation and maintenance experience in a large generating station is essential.

Conditions of service will be in accordance with the N.J.B. Agreement, and superannuation under terms approved by the British Electricity Authority.

Forms of application may be obtained from the Establishments Officer, British Electricity Authority, 53 Wake Green Road, Moseley, Birmingham 13, and should be returned not later than January 5, 1952.

F. W. LAWTON,
Divisional Controller.

(P 450)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Clyde Sub-Area

APPOINTMENT OF SENIOR ASSISTANT ENGINEER (TECHNICAL)

APPLICATIONS are invited for the appointment of Senior Assistant Engineer (Technical) at Sub-Area Headquarters.

The salary and conditions of service will be in accordance with the National Joint Board Schedule, Class "J," Grade 4, £1,001-£1,046 per annum, subject to deductions, including income tax and superannuation contributions.

Applicants should possess a degree in electrical engineering or equivalent qualification and have experience of the design, construction and operation of distribution systems together with specialised knowledge of metering practice and testing, protective gear application and testing, supervisory and remote control, communications and electronics.

Applications, stating age, education, qualifications, experience, present position and salary should be received by The Manager, The South West Scotland Electricity Board, Clyde Sub-Area, 206 St. Vincent Street, Glasgow C.2, not later than 14 days from the appearance of this notice. (P 438)

ELECTRICITY SUPPLY BOARD

VACANCIES

THE ELECTRICITY SUPPLY BOARD invites applications from:—

(i) University graduates with degrees in mechanical or electrical engineering;

(ii) Corporate Members of the Institution of Mechanical or of the Institution of Electrical Engineers;

(iii) Graduates of the Institution of Mechanical or of the Institution of Electrical Engineers.

Vacancies exist in the Board's organisation for:—

(a) SHIFT ENGINEERS in generating stations; working hours per week: 42.

(b) NON-SHIFT ENGINEERING and TECHNICAL POSITIONS in generating stations and various departments.

For post under (a), the salary scale applicable is £483-£846 (including cost-of-living bonus), plus an allowance of 12½% in respect of shift work.

Preference will be given to candidates who have had suitable experience in a modern steam generating station or in a railway or dockyard works or in the works of a manufacturer of generating station mechanical plant.

For posts under (b), the salary scale for staff holding a university degree or corporate membership of either of the Institutions is £483-£846 (including cost-of-living bonus); the scale for graduates of the Institutions will depend on qualifications and experience.

Each application should state briefly candidate's age, technical training and qualifications, date of graduation or Corporate Membership, and practical experience, and should indicate the type of vacancy for which the candidate wishes to be considered. If an applicant wishes to be considered for alternative types of employment, his order of choice should be stated.

Applications should be addressed to the Personnel Officer, 27 Lower Fitzwilliam Street, Dublin, and should reach him not later than Saturday, January 5, 1952.

PATRICK J. DEMPSEY,
Secretary.

December 14, 1951. (P 494)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable positions with salary and conditions of service in accordance with N.J.B. Schedule:—

TURBINE HOUSE SUPERINTENDENT (Fulham Generating Station).

Candidates should have received a sound mechanical and electrical engineering training with a first-class technical background. A wide experience is necessary in the efficient operation and maintenance of large modern generating plant and auxiliary equipment, together with ability to plan and organise work to a strict time schedule.

The engineer appointed will have an important part to play in the station's labour relations policy, and experience and success in this part of the work is necessary; modern concept of management is essential.

Salary: Class "L", Grade 6, i.e. £1,020 12s., including London Allowance.

ASSISTANT SHIFT CHARGE ENGINEERS (West Ham Generating Station).

Candidates should have received a sound training in electrical and mechanical engineering and good technical training.

Candidates will be required to carry out the duties of control room engineers or boiler house engineers, according to requirements and will be directly responsible to the shift charge engineer.

Salary: Class "G", Grade 9, i.e. £652 1s., inclusive of London Allowance.

Applications, stating age, qualifications and experience should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1, and be received within 14 days of the appearance of this advertisement.

H. V. PUGH,
Divisional Controller.
(P 471)

SOUTH EASTERN ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT ENGINEER
Thanet District.

SALARY £694 to £708 p.a. under N.J.B. Schedule, Class "D," Grade 5. Superannuation will be arranged. Applicants should be qualified, with a sound general and technical education, and be experienced in the design, construction and maintenance of h.v. and medium pressure overhead and underground distribution systems; also in the operation of a large d.c. network including the maintenance of rotary and rectifier substations and in d.c./a.c. changeover. Duties involve standby. Person appointed will have the option of renting a seven-roomed flat.

Applications, giving two referees, must reach H. J. C. Carte, M.B.E., A.I.E.E., Thanet Manager, S E E Board, St. Peter's, Broadstairs, Kent, by January 7, 1952.

A. L. BURNELL,
Secretary.

December, 1951. (P 496)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

JUNIOR ENGINEER, HINCKLEY

APPLICATIONS are invited for the position of Junior Engineer at Hinckley Generating Station.

Applicants should have had a sound technical training and experience in power station operation would be an advantage.

Salary will be in accordance with Class "B", Grade 12: £389 to £405 per annum, of the National Joint Board Agreement.

The post will be superannuable within the provisions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned not later than January 14, 1952.

L. F. JEFFREY,
Divisional Controller.
(P 477)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the appointment of ENGINEERING DRAUGHTSMAN in the Engineering Department at the Headquarters of the Board, Electricity House, Love Lane, Liverpool 3, at a salary within the range £413-£547 per annum (N.J.B. D/6).

Applicants must have obtained the Ordinary National Certificate, and have experience in the general design and layout of indoor and outdoor substations up to 33 kV cable layouts, diagrams of connections, etc.

The appointment is superannuable and subject to medical examination.

Applications should be made on forms obtainable from the Establishments Officer (Ref. 20A) at the above address, and should be returned so as to be received before January 7, 1952.

JAMES RANKIN,
Secretary.
(P 478)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments at Northmet Sub-Area Headquarters:—

126/51 R

CIVIL ENGINEERING AND BUILDINGS—
SECOND ASSISTANT ENGINEER

In collaboration with the Board's architect at Wherstead, Ipswich, the successful candidate will be in charge of the design, construction and maintenance of all buildings and civil engineering works, including bulk supply and distribution substations, offices, service centres, and workshops.

He will be required to assist in the acquisition of land, including licensing and planning negotiations, the control of drawing office staff, and the general supervision of contracts.

The salary will be in accordance with Class "M", Grade 7 of the National Joint Board Salary Agreement, commencing at £961 p.a., plus £48 p.a. London Allowance.

127/51 R

ENGINEERING DRAUGHTSMEN

In either of the following branches:—

Substations: Layout of switchgear, transformers and associated equipment for outdoor and indoor type substations up to 33 kV.

Mains: Overhead line design and layout of associated equipment, underground cable trench sections, survey and route plans, and general mains recording maps and plans.

The salary for these appointments will be in accordance with Grade 6, Schedule "D" of the National Joint Board Salary Agreement within a salary range of £438 to £574 p.a., including London Allowance.

Future salaries and conditions of service for the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, qualifications and experience with details of present appointment and salary, should be submitted to the Manager, Northmet Sub-Area Eastern Electricity Board, Northmet House, Southgate, London, N.14, within 14 days of the appearance of this advertisement. (P 482)

BRITISH ELECTRICITY AUTHORITY

North Western Division

DEPUTY STATION SUPERINTENDENT required at Trafford Generating Station, Trafford Park, Manchester, 17. Engineering qualifications and experience in administration, operation and maintenance of a steam generating station essential. Salary £887-£925 (N.J.B. Grade 3, Class "F"). Apply by 5th January to Establishmetns Officer, British Electricity House, Wilmslow Road, Manchester 20, quoting Vacancy No. 644. (P 497)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of DEMONSTRATOR in the North Staffs Sub-Area.

Applicants should have had a good general education and the possession of a recognised diploma in domestic science and electricity housecraft will be an advantage.

Duties will include the conducting of lecture demonstrations both in the service centres and on consumers' premises and advice to consumers on the selection and use of electrical apparatus.

Salary and conditions of service will be in accordance with the N.J.C. Grade 1 within the range of £360 to £400 per annum, with further progress to £440 per annum, subject to satisfactory service.

The successful applicant will be required to contribute to the Board's Superannuation Scheme, if eligible.

Training will be given where necessary to a suitable applicant.

Applications, in writing, stating age, education etc., should be forwarded within 14 days to Sub-Area Manager, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS,
Secretary.
(P 492)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 2 (Huddersfield) Sub-Area

SECOND ASSISTANT DISTRICT ENGINEER (Huddersfield) (Vacancy No. 148/51).

Applicants should hold qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers, and must have had a sound practical training and extensive experience in the design, construction, operation and maintenance of h.v. and l.v. overhead and underground distribution networks, substation plant and ancillary equipment.

Salary: N.J.B. Agreement Class "G", Grade 7 £704 to £733 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 2 (Huddersfield) Sub-Area, Yorkshire Electricity Board, Market Street, Huddersfield, within 14 days of the appearance of this advertisement. (P 476)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

STATION SHIFT CONTROL ENGINEER
Great Yarmouth Generating Station

Salary in accordance with N.J.B. Schedule A, Grade 10, Class "D," (£511-£527 per annum).

Applicants should have reached the standard of Ordinary National Certificate in Electrical Engineering or its equivalent, have experience in the operation of a switchboard at a generating station and be fully conversant with high voltage switching operations and protective systems.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards Superannuation Scheme.

Applications stating age, experience and present position should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than January 5, 1952.

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (P 493)

ADVERTISING DEPARTMENT of well-known electrical engineering company in Central London requires an ASSISTANT (25-35). Duties include collecting and editing data from engineering and commercial departments for catalogues and technical publications. Some knowledge of electric lamps and lighting equipment is desirable.—Write, giving details of experience and salary to Box No. 1307, Electrical Times. (P 435)

DRAUGHTSMEN (one senior, one junior), ELECTRICAL. Age range, 24-48. Experienced l.t. control gear, plant layout, and diagrams. Must have sound recognised apprenticeship and possess Higher National Certificate or equal. Site within easy reach of Wolverhampton. Good pension scheme (compulsory), canteen facilities, five-day week. State age, present salary, give references and detail apprenticeship training.—Box No. 1259, Electrical Times. (P 299)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

DRAWING AND TRACING, LTD., have vacancies for experienced SENIOR DRAUGHTSMEN and JUNIOR DETAIL DRAUGHTSMEN in their production drawing office, specialising in radio, electrical and mechanical engineering. 5-day week. Pension scheme. Good working conditions. Salary range £390-£533.—Write, stating age and experience, 456 Ewell Road, Surbiton, Surrey. (P 431)

ELECTRICAL ENGINEER. For Power Cable Designs and specifications. Electrical engineering works in N.W. Kent, near London. Minimum qualification: H.N.C.—degree standard preferred.—Details of age, experience, etc., to Box 8715, c/o Whites, Ltd., 72 Fleet Street, E.C.4. (P 436)

FOREIGN OFFICE ADMINISTRATION OF AFRICAN TERRITORIES. Applications are invited for the following vacancies in the Public Works Department under the Government of Cyrenaica.

(1) An ELECTRICAL AND MECHANICAL ENGINEER for the design of new and modification of existing diesel power and pumping stations, overhead and underground distribution up to 11 kV, as suited to small towns. Candidates should be graduates of the I.E.E. or hold a Higher National Certificate and have experience in power supply undertakings. Knowledge of mechanical engineering, public lighting and industrial installations would be an advantage. Salary scale: £525 by £20 to £625 p.a. (Ref. D559/51-0).

(2) An ELECTRICAL MECHANIST for erection of new main switchgear, installation and maintenance of motors and control gear in small pumping stations and modernisation of town distribution systems up to 11 kV. Candidates should have had an electrical engineering training, hold a H.N.C. or O.N.C. in electrical engineering and have had supervisory experience of power distribution in urban districts. Experience with I.C. engines would be an advantage. Salary scale £400 by £15 to £475 p.a. (Ref. D560/51-0).

In addition, a Foreign Service Allowance: £160 to £530 p.a. will be payable, according to individual circumstances. Contracts for two years, subject to medical examination, renewable by mutual agreement. Salary is not liable to U.K. income-tax (Schedule E), and Foreign Service Allowance is free of tax. There is at present no local tax.

The climate of Cyrenaica is pleasant, healthy and suitable for British families. Home leave is granted at the rate of 72 days for each two years of resident service. Local leave at the rate of 18 days annually. Leave passages for officials and their families, as well as passages on first appointment and on termination of contract are at Government expense.

Application forms from Ministry of Labour and National Service, Technical and Scientific Register (K), Almack House, 26 King Street, London, S.W.1. Quoting appropriate Ref. No. Closing date January 12, 1952. (P 469)

JUNIOR CONTRACTS ENGINEER required by manufacturers of Diesel-electric locomotives. Applicants should be between the ages of 22 and 30, with technical training to graduate I.E.E. or I. Mech. E. standard and preferably practical experience or an apprenticeship with manufacturers of Diesel-electric traction equipment. The post will involve the commercial and general technical aspects of Diesel-electric locomotive manufacture and it will be an advantage if applicants possess previous contracts experience of this nature. Excellent prospects for man with personality and ambition. — Applications in confidence to Box No. 1305, Electrical Times. (P 434)

JUNIOR TECHNICAL SALES ASSISTANT required for quotation and order work in switchgear manufacturers' London Office.—Box No. 1317, Electrical Times. (P 483)

KENYA.—THE EAST AFRICAN POWER AND LIGHTING COMPANY have a vacancy for a CONSUMERS' ENGINEER for the Nairobi District. Applicants must have had previous experience of a similar commercial position in a large undertaking over several years. Preference would be given to Chartered Electrical Engineers. Commencing salary will be £1,000 per annum, plus a marriage allowance of £100 per annum, free house with free electricity, company medical scheme, six months leave on full pay on completion of four years' tour with free passage out and home for the successful applicant and his wife. Post, which is subject to a six months probationary period, is pensionable and there is a dependents' benefit scheme.—Applications, giving full particulars of past experience, technical qualifications, age, etc., should be addressed to Balfour, Beatty and Co., Ltd., 66 Queen Street, London E.C.4. (P 486)

KUWAIT OIL CO. require an ASSISTANT ELECTRICAL ENGINEER (DESIGN) for service in Kuwait. Must possess full electrical apprenticeship and higher National Certificate. Graduate members of I.E.E. will be given preference. Must have experience in mains design and planning up to 11,000 V. Planning of industrial layouts an advantage. Age 30-35. Salary starting £830 p.a. clear, plus generous allowances, pension scheme and kit allowance.—Write, giving personal details and quoting K.1391, to Box D/80, at 191 Gresham House, E.C.2. (P 315)

KUWAIT OIL CO. invites applications for the post of ASSISTANT ELECTRICAL ENGINEER (INSTALLATION) in Kuwait. Required for installation of high-voltage switchgear and plant up to 11,000 V and motors up to 500 h.p.; also the checking of complex protective relays. Mechanical experience an advantage. Must possess Higher National Certificate, but preference given to corporate members of I.E.E. Age 30 to 35. Salary starting £830 per annum, plus generous allowances, kit allowance and pension scheme.—Write, giving personal details and quoting K.1386, to Box D/61, at 191 Gresham House, E.C.2. (P 314)

KUWAIT OIL COMPANY requires ELECTRICAL INSTRUMENT ENGINEER for overseas service in the Persian Gulf. Full apprenticeship with reputable instrument manufacturer essential and experience in manufacture and supervising of all types of electrical meters and instruments, including protective relays, automatic voltage regulators, etc. Higher National Certificate essential. Age under 35. Salary starting £830 p.a. clear, plus generous living allowance. Kit allowance; pension scheme. Write, giving details and quoting K.1159 to Box E/80, at 191, Gresham House, E.C.2. (P 453)

LANCASHIRE DYNAMO AND CRYPTO (MFG.) LTD., Trafford Park, have vacancies in the Testing Department, for TRAINEES possessing electrical machinery technical knowledge.—Applications, in writing, should state age, wage required and full details of educational studies to the Personnel and Welfare Manager. (P 479)

LANCASHIRE DYNAMO AND CRYTPO (MFG.) LTD., Trafford Park, require ELECTRICAL TESTERS with experience in all classes of a.c. and d.c. rotating machinery. State age, experience and wage required to Personnel Manager. (P 480)

LIGHTING REPRESENTATIVE required with sales ability and sufficient technical knowledge to enable him to stimulate interest in large fluorescent installations and discuss technical aspects with lighting consultants, architects, etc. London area.—Write, giving full particulars, in confidence, to Box AC.68202, Samson Clarks, 57-61 Mortimer Street, W.1. (P 491)

THE COMMONWEALTH RELATIONS OFFICE invite applications for the post of ELECTRICAL ENGINEER for service with the Central Waterpower Irrigation and Navigation Commission, India. Applicants must be regularly trained electrical engineers, preferably about 45 years of age, with considerable practical experience in generation, distribution and utilisation of electricity. The duties are concerned with the erection of power station plant, electrical transmission, distribution and the operation of electrical machines and equipment required for large-scale hydro schemes. The successful candidate will be required to guide and train the Indian engineers under his control. The appointment is for two to three years. Salary to be negotiated but would be not less than £2,500 p.a. In addition board and lodgings would be provided or a tax-free allowance to cover its cost.—Application forms from Ministry of Labour and National Service (K), Almack House, 26 King Street, London S.W.1, quoting reference No. D567/51-O-A. Closing date January 19, 1952. (P 488)

TECHNICAL GRADES II AND III required for Ministry of Supply Establishment at Malvern, Worcestershire. Qualifications: British, of British parentage; apprenticeship in radio or electrical engineering, with knowledge of use or maintenance of electronic or light electrical equipment; be familiar with engineering drawings and drawing office procedure. Possession of Higher National Certificate (Ordinary National Certificate for Grade III) or equivalent qualification desirable. Duties: Preparation of radio equipment schedules, including spares and servicing recommendations for new radar installations and associated electrical equipment. Additionally, for Grade II, the preparation of technical information on modifications. Salary: Grade II, £540 (linked to age 30) to £645 p.a. Grade III £437 (linked to age 26) to £545 p.a. (rates for women slightly lower). Not established. Opportunities for established pensionable posts may arise. Application forms from Ministry of Labour and National Service, Technical and Scientific Register (K), Almack House, 26 King Street, London S.W.1, quoting Ref. No. D563/51-A. (P 489)

TRACTION MOTOR DRAUGHTSMEN AND DESIGNER DRAUGHTSMEN required by manufacturers of Diesel electric locomotives. A sound knowledge of the mechanical as well as the electrical design of traction motors is essential and applicants should have a wide experience of modern design and production methods in this class of work. Good salaries will be paid to men having these qualifications and special consideration will be given to other problems connected with the engagement of senior staff. Three years' agreement and every facility to find suitable living accommodations will be given. Please apply, giving full details of training, experience, age, etc., to Box No. 1311, Electrical Times. (P 451)

SHOP SALES ASSISTANT. Some previous experience of electrical and radio retail trade essential. Knowledge of repairing appliances (not radio) also essential. Busy shop. Those willing and keen only need apply. Good salary. Phone or write for appointment.—Electrical Service (Edgware) Ltd., 117 Edgware Road, W.2. Tel.: Pad. 2342. (P 466)

APPOINTMENTS WANTED

ELECTRICAL ENGINEER, translator, seeks post. Spanish or Portuguese.—Box No. 1295, Electrical Times. (P 420)

BUSINESS EXECUTIVE long experience accounts, contracts, purchasing in electrical engineering industry. Considerable time present company, seeks position with better propsects.—Write: Box No. 1315, Electrical Times. (P 464)

ELEC. ENGR. (Foreign Grad.), knowing French, Spanish, Portuguese, German, English, desires position. Preferably as Commercial Engineer here or abroad.—Box No. 1293, Electrical Times. (P 419)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 324)

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ENQUIRIES invited for repetition ARMATURE AND STATOR WINDING. Prompt delivery offered.—Magstarlite, Ltd., Beavor Works, Beavor Lane, Hammersmith, London, W.6. (P 411)

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks Ltd., Chapman Street, Loughborough. (L 601)

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A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

A 300 KVA ALTERNATOR, 400/3/50 V, at 375 r.p.m.—Lewis Electric Motors, Moor Works, Maidenhead 2388. (P 384)

DIESELS, GENERATING SETS, Machine tools, etc., bought and sold on behalf clients. Inspections by qualified engineers.—Bramhall Engineering Co., Ltd., Borough Chambers, St. Petersgate, Stockport. (P 383)

ENAMELLED COPPER WIRE, size ·0064 in. (37 ½G), in any quantities up to 500 lb.—Submit offers to Box No. 1309, Electrical Times. (P 439)

MERCURY, platinum points, wire scrap, etc., purchased for cash.—Tresha, 1 Wardrobe Place, Ludgate Hill, London, E.C.4. (Open Sats.) (P 407)

PLATING RECTIFIER UNIT, complete with mains transformer preferred. Input, 400 V, 3 phase, 50 c/s; output, 16/18 V, 1,500 amp.—Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (P 425)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London, E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling.—Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

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WANTED TO CONTACT. Established electrical manufacturer interested in making and marketing, under licence, the TWYLITE SUPER STEAM ELECTRIC IRON. This steam iron has met with great success in Australia and differs in construction from any steam irons being sold on this market.—Box No. 1319, Electrical Times. (P 485)

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COVENTRY Climax 3 kW, 230 V a.c. GENERATING SETS. Reconditioned and fully guaranteed.—Magstarlite, Ltd., Beavor Works, Beavor Lane, Hammersmith London W.6. (P 412)

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MOTORS & STARTERS

A.A. ELECTRICAL CO. FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105. Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

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A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

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ONE 50-h.p. Variable Speed COMMUTATOR MOTOR, 1140/230 r.p.m., complete with control gear.—Box No. 1301, Electrical Times. (P 426)

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MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

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THE PROPRIETOR of British Patent No. 611697 and 611698 entitled "ELECTROMAGNETIC RELAY" and "ELECTRO-MAGNETIC RELAY" respectively, offers same for licence or otherwise to ensure combination working in Great Britian.—Inquiries to Singer, Stern and Carlberg, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A. (P 472)

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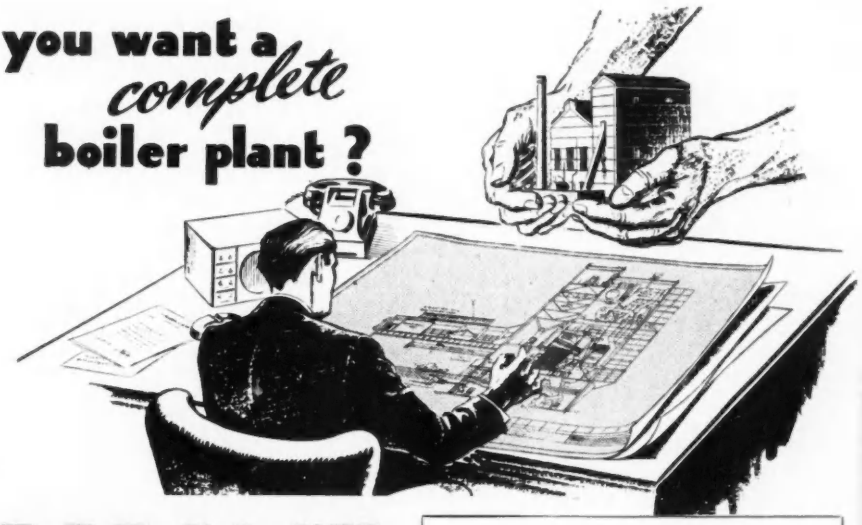

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INDEX TO ADVERTISERS

Austin & Hayes, Ltd. 64

Babcock & Wilcox, Ltd. 51
Belling & Co., Ltd. 6
Berry's Electric, Ltd. 9
Bevgree, Ltd. 62
Bill Switchgear, Ltd. 5
Brentford Transformers, Ltd. ... 14
Britannic Electric Cable & Construction Co., Ltd. 56
British Electrical Repairs, Ltd. ... 10
British Insulated Callender's Cables, Ltd. 25
British Thomson-Houston Co., Ltd. 33
Burn, George, Ltd. 26

Carter, B. & F., & Co., Ltd. ... 66
City Engineering Co. (Boreham Wood), Ltd. 52
Clang, Ltd. 62
Clyde Blowers, Ltd. 58
Connolly's (Blackley), Ltd. ... 28
Copper & Alloys, Ltd. 32
Cox-Walkers, Ltd. 4
Cressall Manufacturing Co., Ltd. 4
Crompton Parkinson, Ltd. ... 15

Desoutter Bros., Ltd. 31
Dexion, Ltd. 64
D. P. Battery Co., Ltd. 12
Drake & Gorham Wholesale, Ltd. 18
Drummond, John (Engineers), Ltd. 62

Electric Construction Co., Ltd. 42
Ellison, George, Ltd. 40
English Electric Co., Ltd. 3, 36

Falk, Stadelmann & Co., Ltd. ... 57
Ferranti, Ltd. 30
Ferranti, Denis, Co., Ltd. ... 70
Fibreglass, Ltd. 34
Foster Transformers & Switchgear, Ltd. 19
Funditor, Ltd. 66

General Electric Co., Ltd. 17, 55
Glover, W. T., & Co., Ltd. ... 37
Grubb Engineering Co., Ltd. ... 14

Hackbridge Cable Co., Ltd. ... 60
Hackbridge & Hewittic Electric Co., Ltd. 43
Heayberd, F. C., & Co., Ltd. ... 58
Henley's, W.T., TelegraphWorks Co., Ltd. 1
Heyes & Co., Ltd. 64
Hick Hargreaves & Co., Ltd. ... 70

International Combustion, Ltd. 29

Johnson & Phillips, Ltd. 16

Lawler, Ayers & Co., Ltd. ... 38

Manganeze Bronze & Brass Co., Ltd. 61
Measurement, Ltd. 23
Measuring Instruments (Pullin), Ltd. 32
Metallic Seamless Tube Co., Ltd. 44
Metropolitan Electric Cable and Construction Co., Ltd. ... 39
Metropolitan-Vickers Electrical Co., Ltd. 27, 59
Metway Electrical Industries, Ltd. 38
Micanite & Insulators Co., Ltd. ... 2
Midland Electric Manufacturing Co., Ltd. 53
M.K. Electric, Ltd. 11
Moss, William, & Sons, Ltd. ... 38

New Day Electrical Accessories, Ltd. 4

Parnall (Yate), Ltd. 69
Partridge Wilson & Co., Ltd. ... 54
Pirelli-General Cable Works, Ltd. 63
Pritchett & Gold & E.P.S. Co., Ltd. 8

Ransome & Marles Bearing Co., Ltd. 21
Revo Electric Co., Ltd. 24
Reyrolle, A., & Co., Ltd. ... 68

Sanders, William, & Co. (Wednesbury), Ltd. 52
Scemco Ltd. 50
Shell-Mex & B.P., Ltd. 35
Siemens Electric Lamps & Supplies, Ltd. 67
Simmonds & Stokes (Niphan), Ltd. 54
Simplex Electric Co., Ltd. ... 13
Smith, Frederick, & Co., Ltd. ... 20
Sperryn & Co., Ltd. 22
Spiral Tube & Components, Ltd. 56
Stainless Steel Wire Co., Ltd. ... 12
Standard Telephones & Cables, Ltd. 65
Statter, J. G., & Co., Ltd. ... 64
Sunvic Controls, Ltd. 28
Symonds, R. H., Ltd. 62
Synchromatic Time Recording Co., Ltd. 66

Veritys, Ltd. 7
V.G. Manufacturing Co., Ltd. ... 18

Weir, G. & J., Ltd. 60
Whitecross Co., Ltd. 26

Zenith Electric Co., Ltd. ... 22

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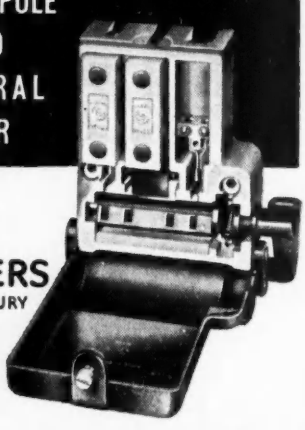

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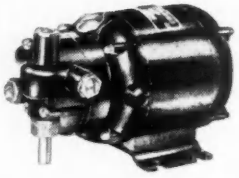

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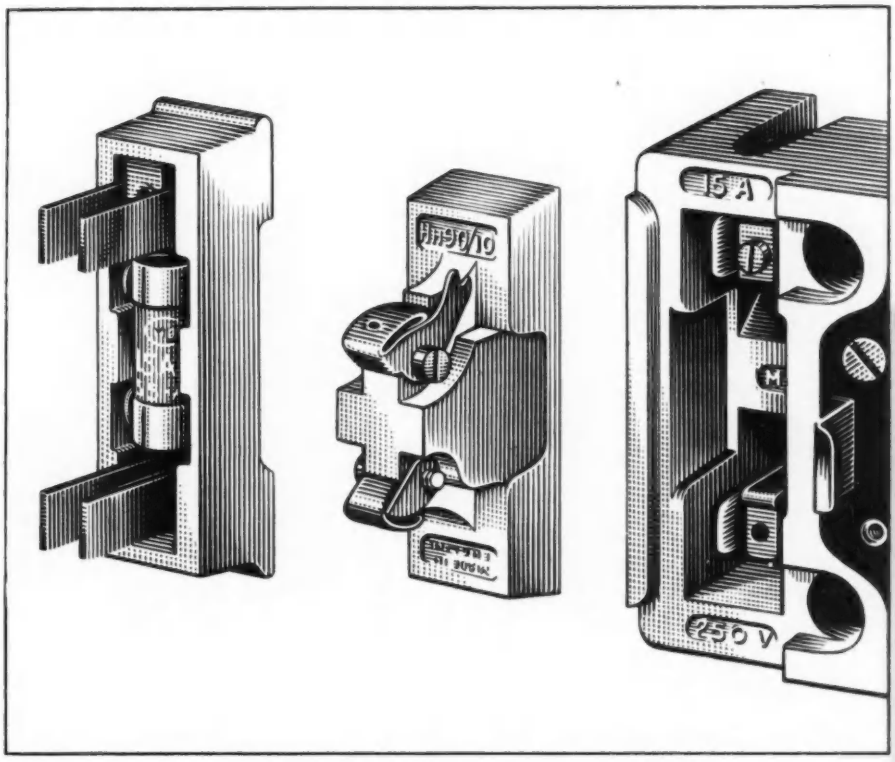

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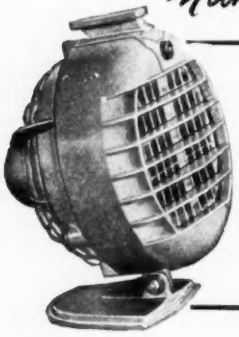

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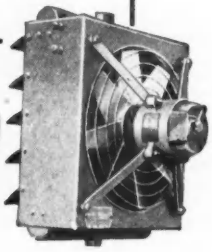

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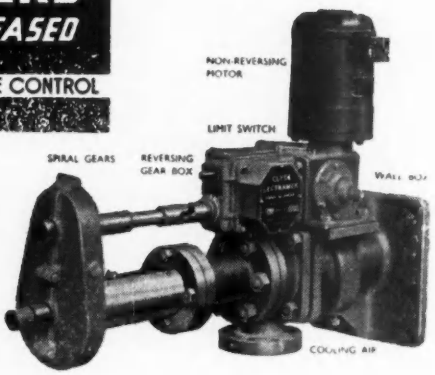

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★ Battersea "A" and "B" combined	26·73
★ Stuart Street (h.p.), Manchester	26·67
Fulham, London	26·51
Lynn, South Wales	26·49
Hams Hall "B," near Birmingham	26·36
Kearsley (h.p.), Lancs.	26·23
Meaford, near Stone, Staffs.	26·02
Dunston "B," Newcastle-upon-Tyne	25·83
Barking "B," London	25·76
★ Battersea "A," London	25·74
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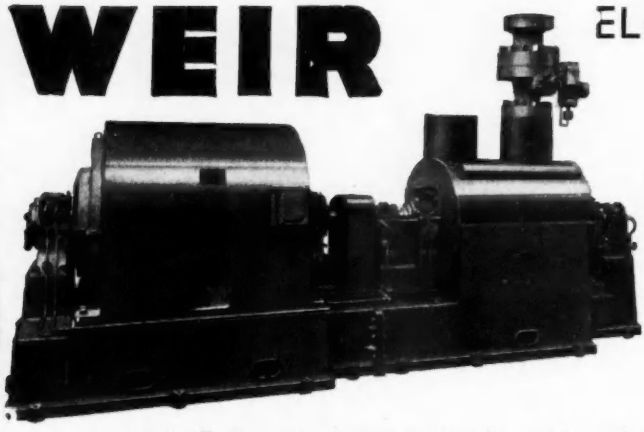

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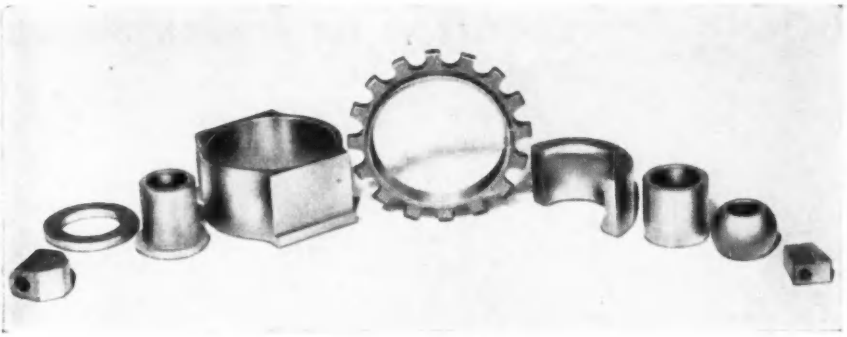

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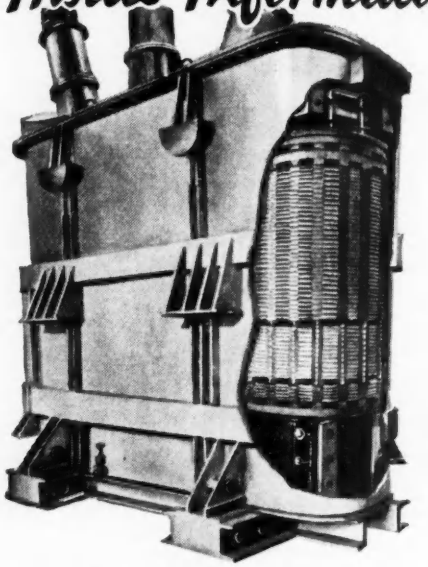

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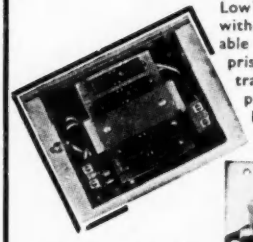

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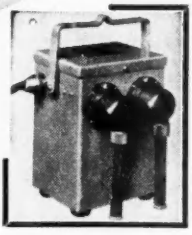

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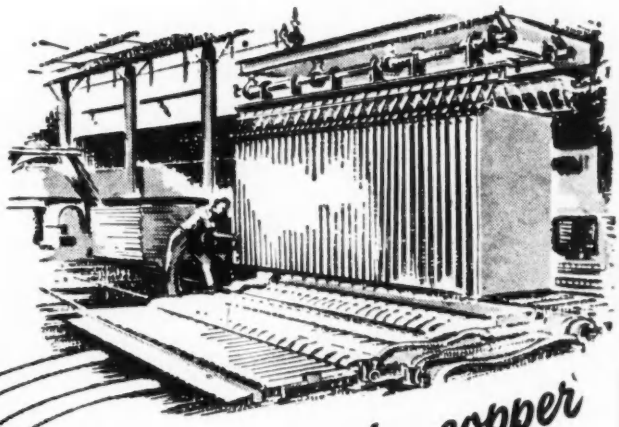

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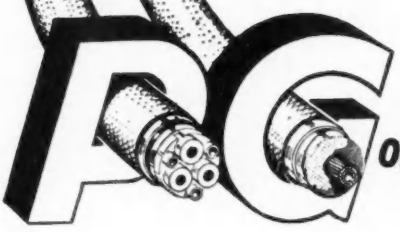

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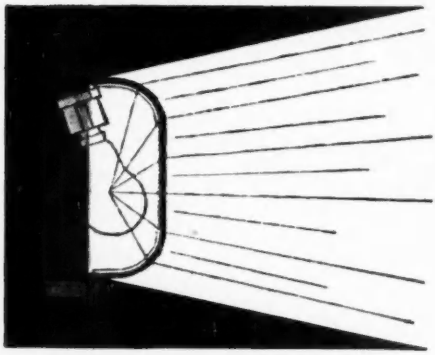

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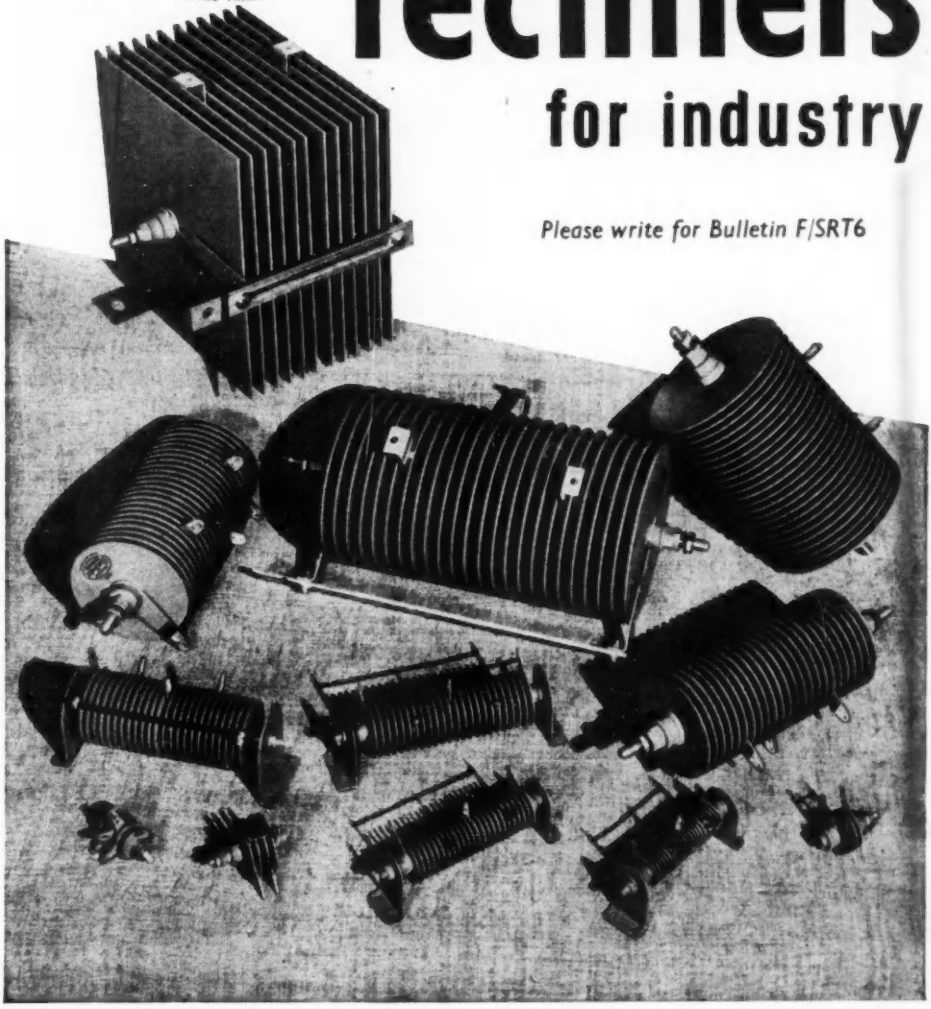

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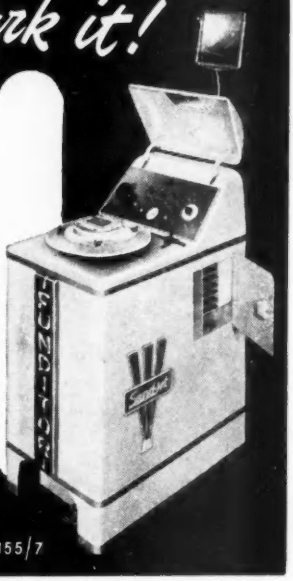

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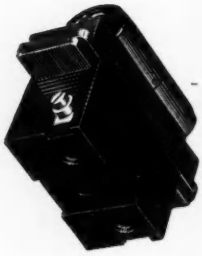

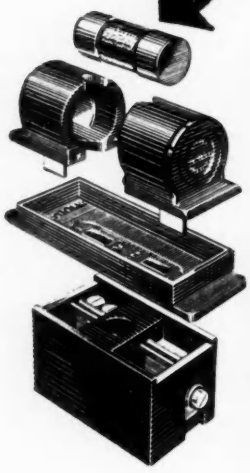

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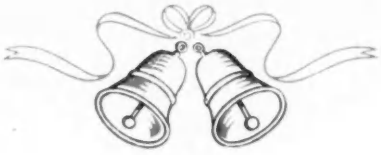

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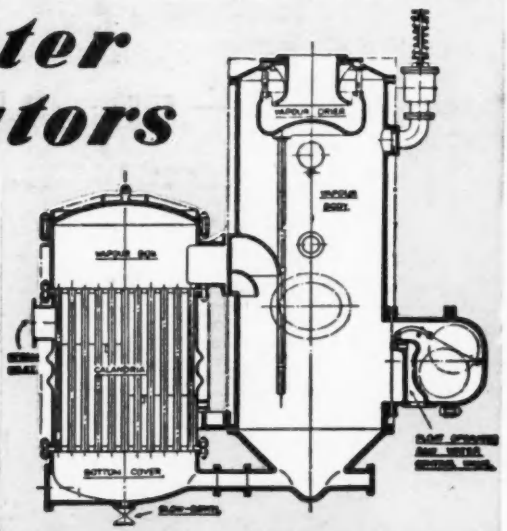

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